Original Copy

REALISTIC

Service Manual

20-221D

DX-440

AM/FM DIRECT ENTRY COMMUNICATIONS RECEIVER

CATALOG NUMBER: 20-221D

CONTENTS

SPECIFICATION

SW ELECTRICAL PERFORMANCE

TEST ITEM		CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range		Min.	2300		kHz
		Max.	26100		kHz
Intermediate Freq.		1st IF	55845	±1	kHz
		2nd IF	450	±1	kHz
Max.Sens.		2300kHz	8	14	dB
		15100kHz	8	14	dB
		25600kHz	8	14	dB
Useable Sens. (S/N 20dB)		2300KHz	20	26	dB
		15100kHz	18	24	dB
		25600kHz	18	24	dB
Audio Fidelity (−6dB)		15100kHz		180	Hz
		15100kHz		2200	Hz
Bandwidth 6dB (a Wide BW		15100kHz	6.5	4-9	kHz
T.H.D. (1mV)		15100kHz	2	4	%
A.G.C. F.O.M.		15100kHz		50	dB
Image Rejection		15100kHz		36	dB
I.F. Rejection (450kHz)		15100kHz		50	dB
Lowest Battery Voltage		15100kHz	4.8	5.4	V
Tuning Indicator Sens. (3rd LED ON)		15100kHz	20	26	dB
Auto Scanning Stop Sens.		15100kHz	20	26	dB
SSB/CW Sens. (S/N=10dB)		15100kHz	−3	+3	dB
Supply Voltage: DC 9V	R.O.: 50mW	Load: 8 ohm	Modulation:1kHz/30% Mod.		

FM ELECTRICAL PERFORMANCE

TEST ITEM		CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range		Min.	87.5	---	MHz
		Max.	108	---	MHz
Intermediate Freq.			10.7	±0.05	MHz
Max. Sens.		90MHz	12	18	dB
		98MHz	12	18	dB
		106MHz	12	18	dB
Useable Sens. (S/N 30dB)		90MHz	18	24	dB
		98MHz	18	24	dB
		106MHz	18	24	dB
Audio Fidelity (−6dB)		98MHz		150	Hz
		98MHz		3.2K	Hz
3dB Limiting (10mV)		98MHz	24	30	dB
Image Rejection		106MHz	36	30	dB
I.F. Rejection		90MHz	60	50	dB
T.H.D. (75kHz dev.)		98MHz	2	4	%
Lowest Battery Voltage		98MHz	4.8	5.4	V
Output Power at 10% T.H.D.		98MHz	1200	900	mW
Stereo Indicator Sens.		98MHz	18	24	dB
Tuning Indicator Sens. (3rd LED ON)		98MHz	18	24	dB
Stereo Separation (1kHz)		98MHz	25	20	dB
Auto Scanning Stop Sens.		98MHz	18	24	dB
Am. Suppression		98MHz		30	dB
Min. Output		98MHz		10	mV
Bass Effect 100Hz		98MHz	±8	±6	dB
Treble Effect 10kHz		98MHz	±8	±6	dB
Supply Voltage: DC 9V	R.O.: 50mW	Load: 8 ohm	Modulation: 1kHz/22.5kHz Dev.		

MW ELECTRICAL PERFORMANCE

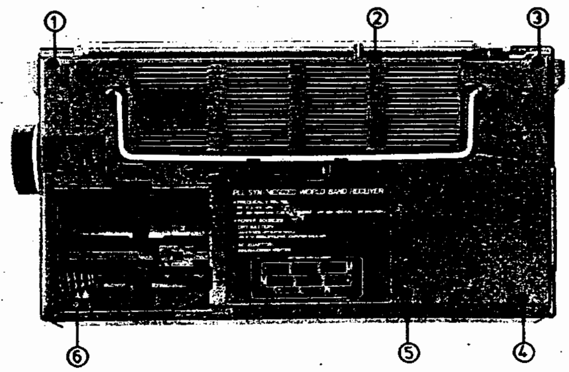
TEST ITEM		CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range		Min.	520		kHz
		Max.	1620		kHz
Intermediate Freq.		1st IF	55845	±1	kHz
		2nd IF	450	±1	kHz
Max. Sens.		600kHz	48	54	dB
		1000kHz	46	52	dB
		1400kHz	46	52	dB
Useable Sens. (S/N 20dB)		600kHz	56	62	dB
		1000kHz	54	60	dB
		1400kHz	54	60	dB
Audio Fidelity (-6dB)		1000kHz		180	Hz
		1000kHz		2200	Hz
A.C.A. (1mV/m, ±10kHz)		1000kHz		46	dB
Bandwidth 6dB @ Wide BW		1000kHz	6.5	4-9	kHz
T.H.D. (5mV/m)		1000kHz	2	4	%
A.G.C. F.O.M.		1000kHz		40	dB
Image Rejection		1000kHz		36	dB
I.F. Rejection (450kHz)		1000kHz		46	dB
Whistle Modulation (5mV/m)		2IF/3IF	10	15	%
Lowest Battery Voltage		1000kHz	4.8	5.4	V
Tuning Indicator Sens. (3rd LED ON)		1000kHz	58	63	dB
Auto Scanning Stop Sens.		1000kHz	58	63	dB
Supply Voltage : DC 9V	R.O. : 50mW	Load : 8 ohm	Modulation : 1kHz/30% Mod.		

LW ELECTRICAL PERFORMANCE

TEST ITEM		CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range		Min.	150		kHz
		Max.	281		kHz
Intermediate Freq.		1st IF	55845	±1	kHz
		2nd IF	450	±1	kHz
Max. Sens.		170kHz	54	58	dB
		220kHz	50	54	dB
		280kHz	50	54	dB
Useable Sens. (S/N 20dB)		170kHz	64	70	dB
		220kHz	62	68	dB
		280kHz	62	68	dB
Audio Fidelity (-6dB)		220kHz		180	Hz
		220kHz		2200	Hz
A.C.A. (1mV)		220kHz		46	dB
Bandwidth 6dB @ Wide BW		220kHz	6.5	4-9	kHz
T.H.D. (10mV/m)		220kHz	2	4	%
A.G.C. F.O.M.		220kHz		40	dB
Image Rejection		220kHz		32	dB
I.F. Rejection		220kHz		46	dB
Lowest Battery Voltage		220kHz	4.8	5.4	V
Tuning Indicator Sens.		220kHz	62	68	dB
Auto Scanning Stop Sens.		220kHz	62	68	dB
Supply Voltage : DC 9V	R.O. : 50mW	Load : 8 ohm	Modulation : 1kHz/30% Mod.		

NOTE: Nominal specs represent the design specs; all units should be able to approximate these – some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit perform to less than any limit spec.

DISASSEMBLY INSTRUCTION

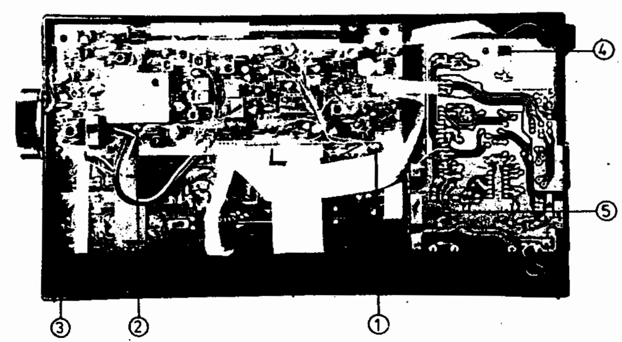


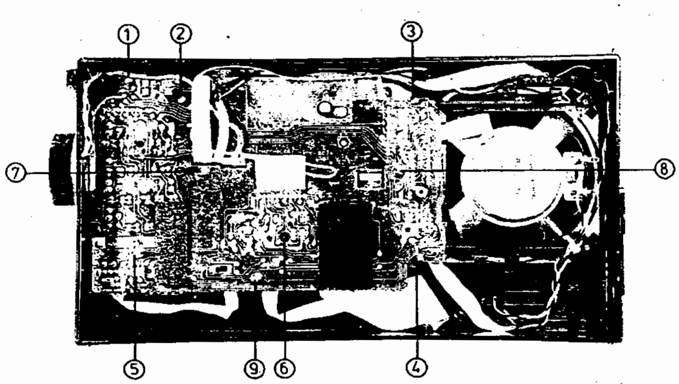
TO REMOVE BACK COVER

a. Unscrew ①~⑥ TP screws 2.6×12.
b. Lift the back cabinet up.

TO REMOVE PCB A-1 and PCB B

a. Unscrew ① M screw 2.6×4 PW and
   ②~③ TP screws 2.6×8 to remove PCB A-1.
b. Release PCB B from hooks ④~⑤ to remove it.

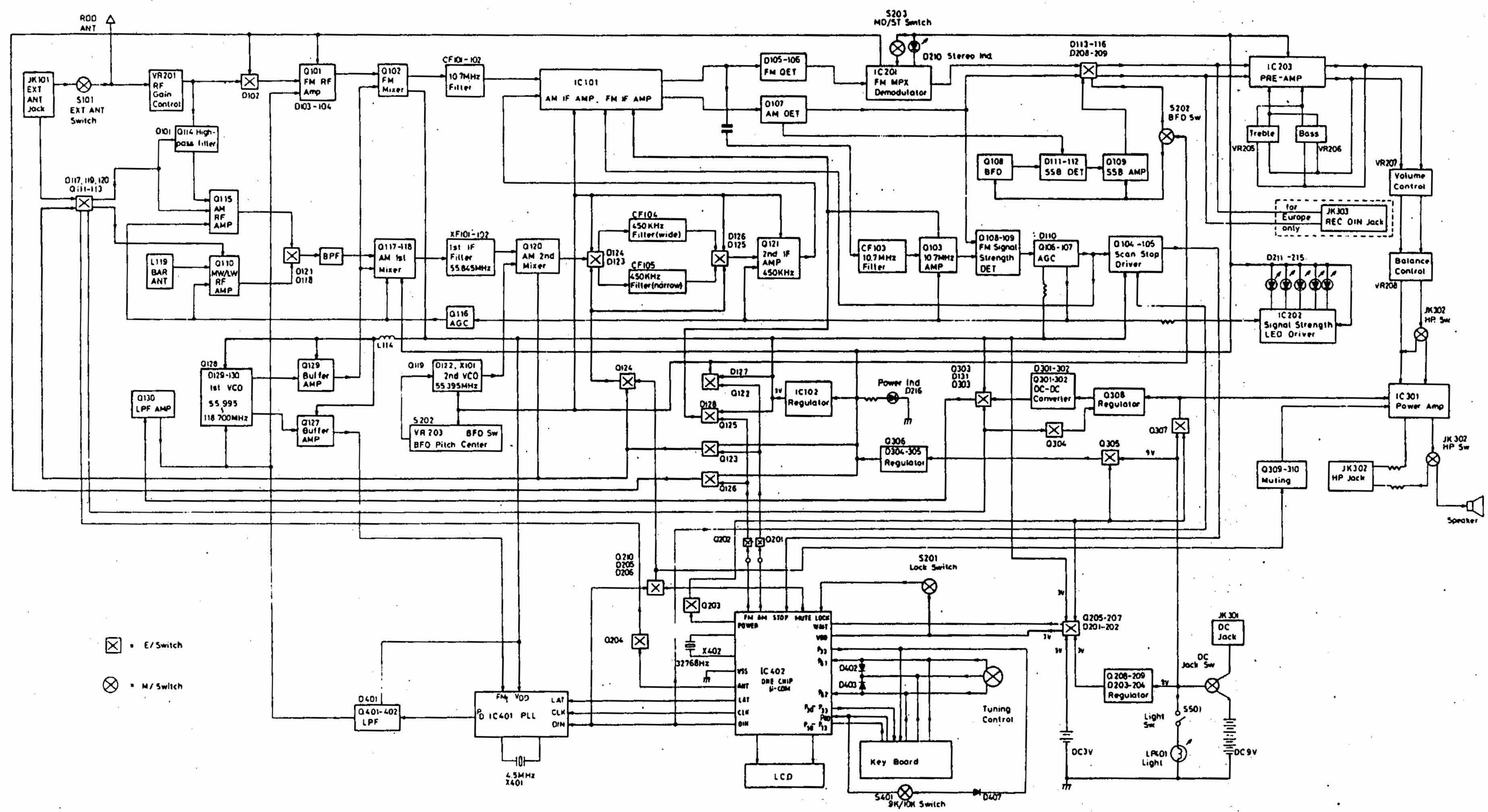




TO REMOVE PCB A-2 and PCB C

a. Unscrew ①~⑥ TP screws 2.6×8 to remove
   PCB A-2 and PCB C togather from front cabinet.
b. Unscrew ⑦~⑨ M screws 2.6×4 PW to remove PCB A-2.

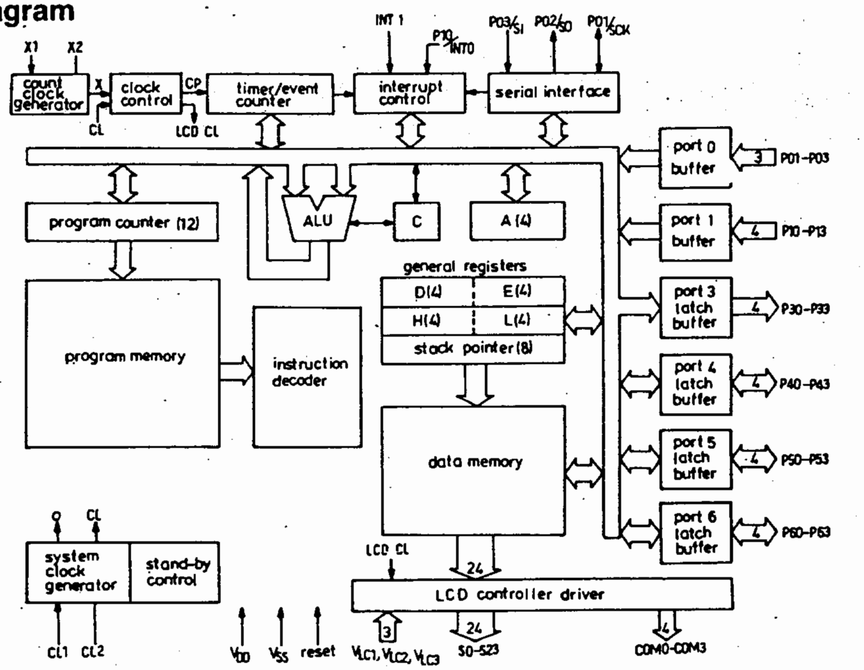
BLOCK DIAGRAM



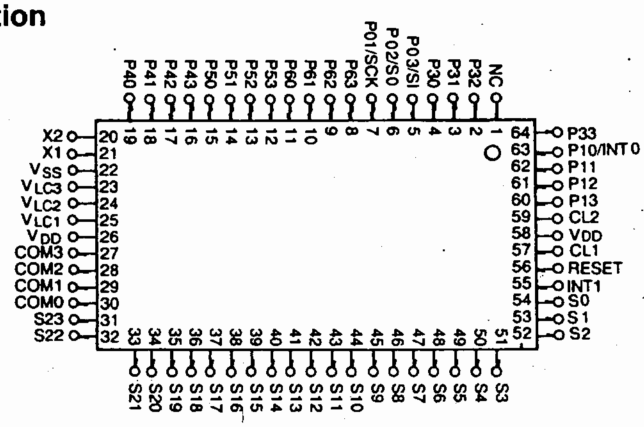
CIRCUIT DESCRIPTION

(1)IC402-μPD7503G-A65 (One chip μ-Com.)

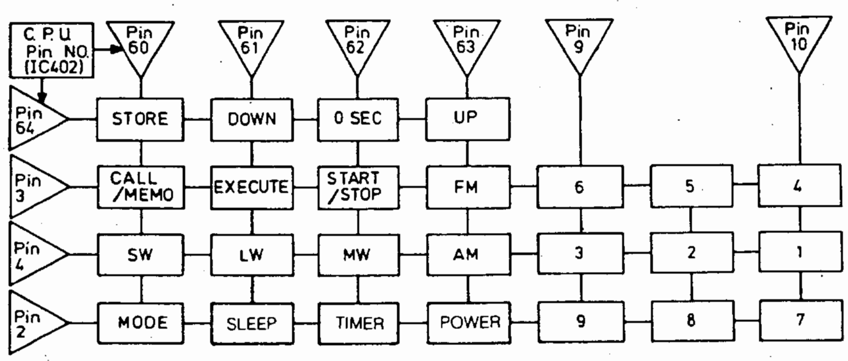
Block Diagram



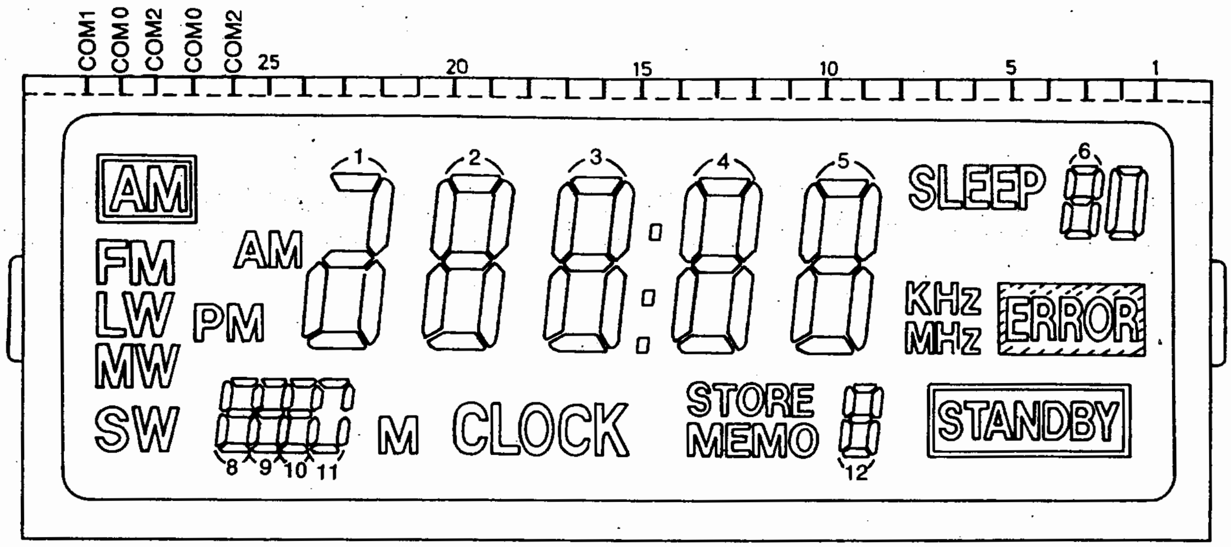
Pin Configuration

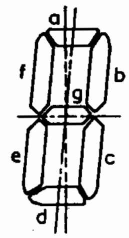


(2) Keyboard Matrix



(3) Liquid Crystal Display (LD-BU7140J)





Pin Connection

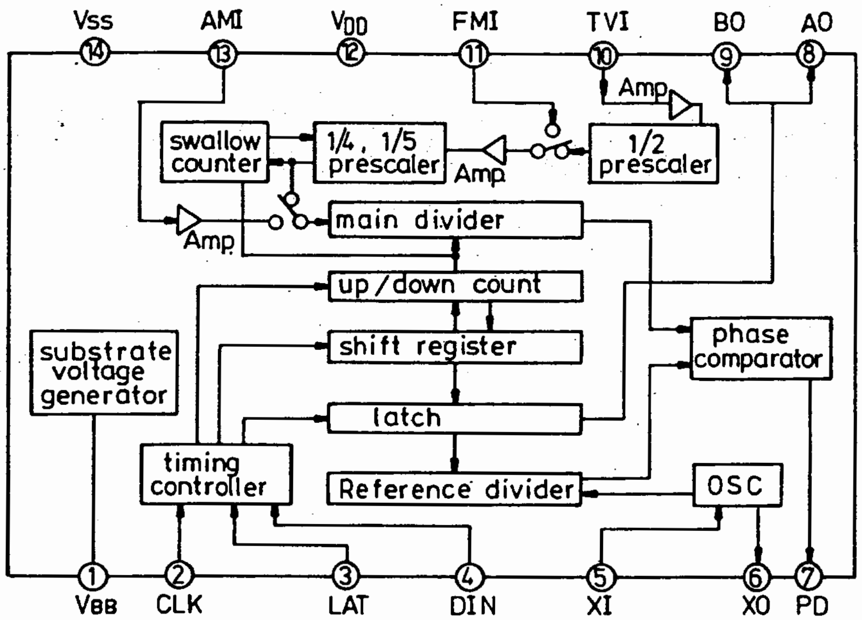
PIN NO IC402	28 COM 2	29 COM 1	30 COM 0	PIN NO LCD
54	12b	12c	Stand by	1
53	12a	12g	12d	2
52	12f	12e	MHz FM □ (Dot)	3
51	6b	6c	ERROR	4
50	6a	6g	6d	5
49	6f	6e	SLEEP ▯	6
48	5b	5c	kHz	7
47	5a	5g	5d	8
46	5f	5e	STORE	9
45	4b	4c	MEMO	10
44	4a	4g	4d	11
43	4f	4e	□ □ COLUMN	12

IC402-C.P.U. (μPD 7503G-701)

Pin NO IC402	28 COM 2	29 COM 1	30 COM 0	Pin NO LCD
42	3b	3c	LW	13
41	3a	3g	3d	14
40	3f	3e	MW	15
39	2b	2c	CLOCK	16
38	2a	2g	2d	17
37	2f	2e	1a 1d 1e 1g	18
36	1b	1c	(Time) AM	19
35	10f	11f	11a 11b 11c 11d 9a 9d 9g	20
34	8a	–	–	21
33	8g	8f	9f	22
34	–	8e	9e	23
32	8d	[AM]	PM	24
31	10a 10d 10g	11e SW M	10e	25

(4) IC401-CX-7961 A-1 (Frequency Synthesizer PLL)

Block Diagram



Pin Description

No.	Symbol	Description.
1	VBB	Substrate terminal (connect 0.01uF capacitor to the ground)
2	CLK	Clock input terminal for 20-bit serial (to be shifted with signal rise)
3	LAT	Latch signal input terminal for shift register input data (to be latched with signal rise) as well as the UP/DOWN clock input terminal (its state to be changed with signal rise)
4	DIN	Data input terminal as well as the UP/DOWN mode switching terminal (UP at "H" level, DOWN AT "L" level)
5	XI	Crystal oscillator connection terminal for the reference signal generation (7.2MHz max.; 4.0MHz standard)
6	XO	
7	PD	Phase comparator output terminal (3 states)
8	AO	External control (signal output terminal/unlock output teminal (E/E MOS push-pull)
9	BO	External control signal output terminal/data check terminal (E/E MOS push-pull)
10	TVI	High frequency signal input termianl (180MHz or 240MHz max.) 1/2 prescaler is built-in.
11	FMI	High frequency signal input terminal (90MHz or 125MHz max.)
12	V_{DD}	Power supply (+3V)
13	AMI	High frequency signal input terminal (20MHz or 25MHz max.)
14	V_{SS}	Ground terminal

Control Data Transmitted

Control data is always transmitted whenever the power is turned on or the reception frequency is varied.
The 40-bit datas including the reference divider and the programmable divider frequency division number are described in the following.

(A) Reference divider frequency division number (Ref. Fig.3 , shown on page 10)

R0	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	P11	P12	A	B	T1	C1
LSB	division number in binary value												MSB	input selection		output mode		*1	*2
0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	1	*3	*3	1	0

An offset component exists between the actual frequency division number and transmitted data. Their relationship is as follows. (Actual frequency division number)=(Transmitted data)+2
Reference frequency is always set in 1kHz and is not relevant to reception frequency or band on the DX-440
Therefore the transmitted division number will be assigned as follows:

$$\frac{4500\text{kHz}}{1\text{kHz}} - 2 = 4498$$

In binary value 4498 ⇒ 01000110010010 (↑ LSB)

(B) Programmable divider frequency division number (Ref. Fig.3 , shown on page 10)

N0	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	N13	N14	N15	N16	N17	T2	C2
LSB	division number in binary value																MSB	*1	*2
						as example												0	1

The relationship between actual frequency division number (X) and the transmitted data (N) is as follows: X=N+8
Thus the transmitted division number will be assigned as,

$$N = \frac{\text{The 1st LOCAL OSC FREQUENCY}}{1\text{kHz}} - 8$$

NOTE:
* 1: Output mode selection code
* 2: Latch direction code
* 3: Do not care

For example (A), while FM 100MHz is setting:

(1) Frequency indicated on the LCD → 100MHz

(2) The 1st local frequency → 100MHz+10.7MHz
(in super heterodyne) =110.7MHz

(3) The transmitted division number

$$\rightarrow N = \frac{110700\text{kHz}}{1\text{kHz}} - 8 = 110692$$

(4) In binary value → N⇒011011000001100100 (↑ LSB)

For example (B), while AM 10MHz is setting:

(1) Frequency indicated on the LCD → 10MHz

(2) The 1st local frequency → 10MHz+55.845MHz
=65.845MHz

(3) The transmitted division number

$$\rightarrow N = \frac{65845\text{kHz}}{1\text{kHz}} - 8 = 65837$$

(4) In binary value → N⇒010000000100101101 (↑ LSB)

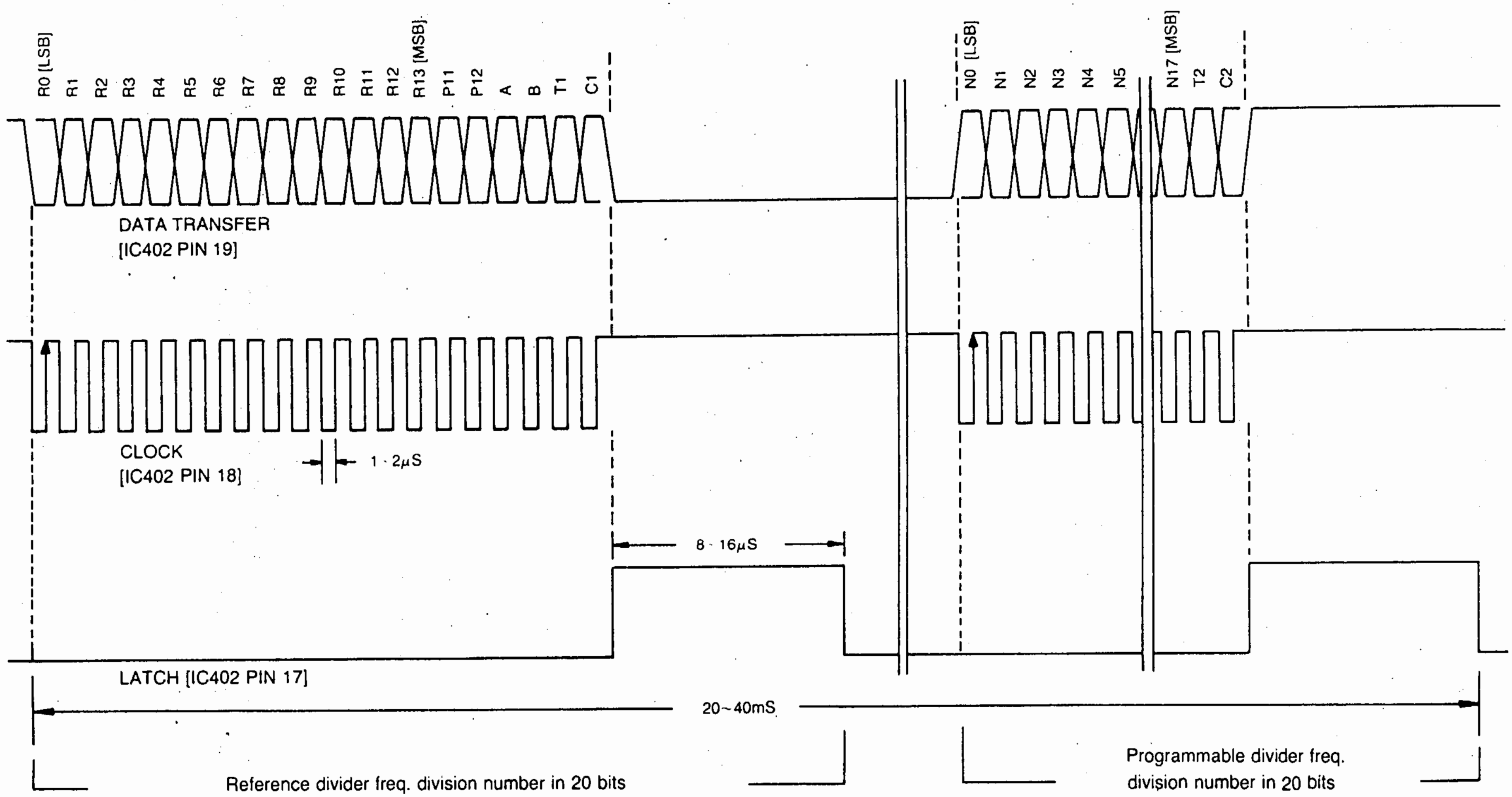
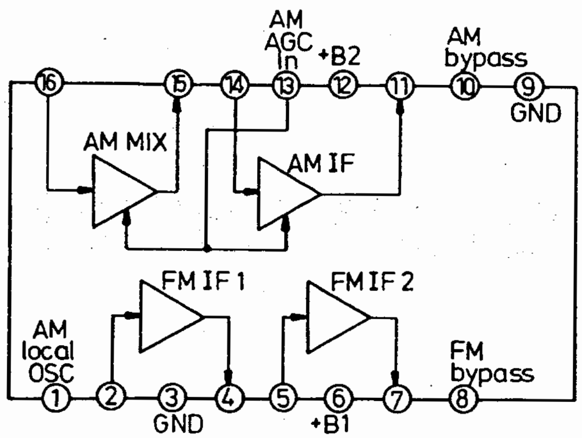
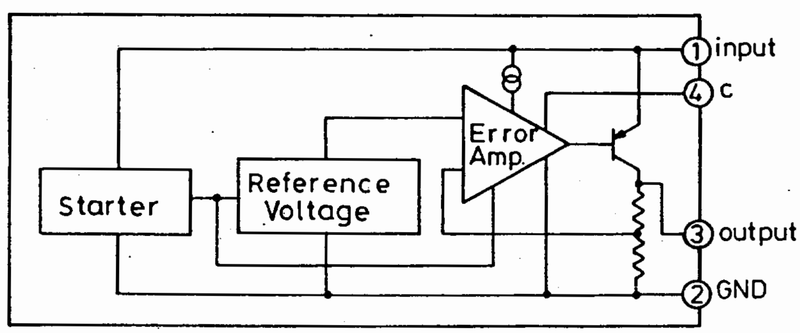

R0 [LSB]
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13 [MSB]
P11
P12
A
B
T1
C1
N0 [LSB]
N1
N2
N3
N4
N5
N17 [MSB]
T2
C2
DATA TRANSFER
[IC402 PIN 19]
CLOCK
[IC402 PIN 18]
1 · 2μS
8 · 16μS
LATCH [IC402 PIN 17]
20~40mS
Reference divider freq. division number in 20 bits
Programmable divider freq.
division number in 20 bits

Fig.3

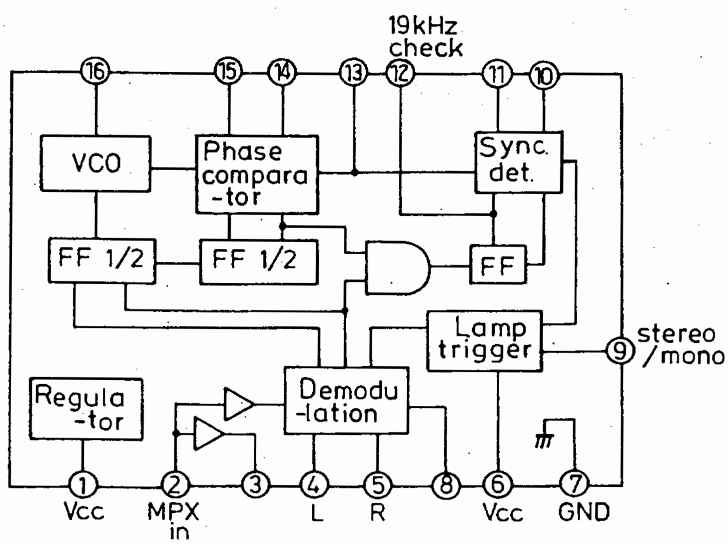
(5) IC101-μPC1018C (AM IF Amp, FM IF Amp.)



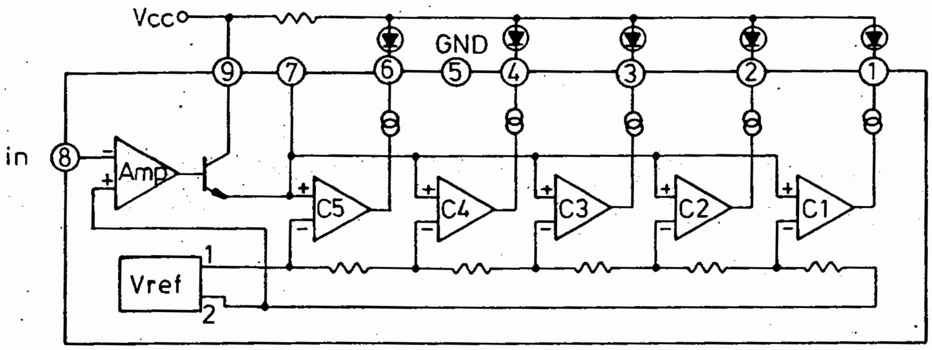
(6) IC102-LA5003 (Regulator)



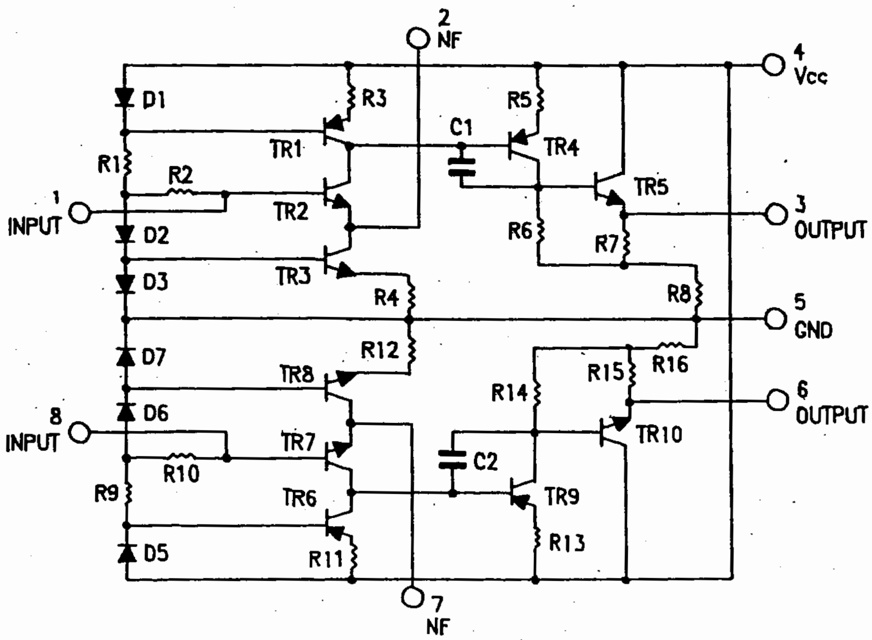
(7) IC201-LA3361 (FM MPX Demodulator)



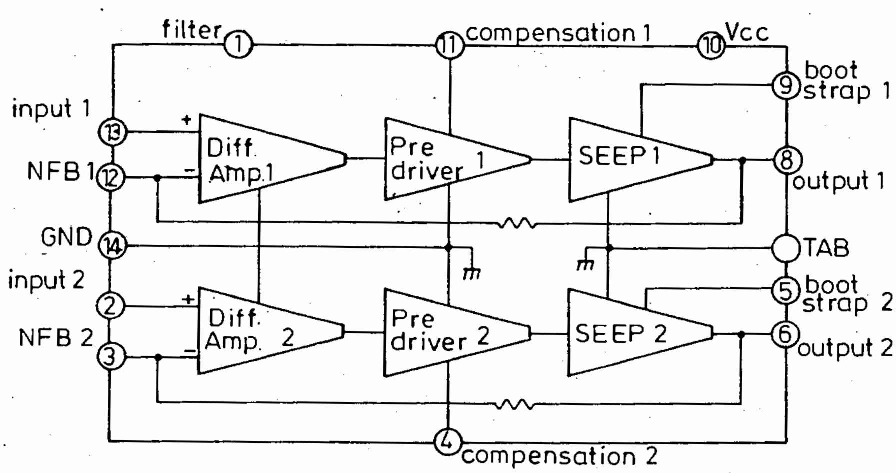
(8) IC202-TA7366P (Signal strength, LED driver)



(9)IC203-M6900L (Pre-Amp.)



(10) IC301-μPC 1263C2/μPC1316C (Power Amp.)



ALIGNMENT INSTRUCTION

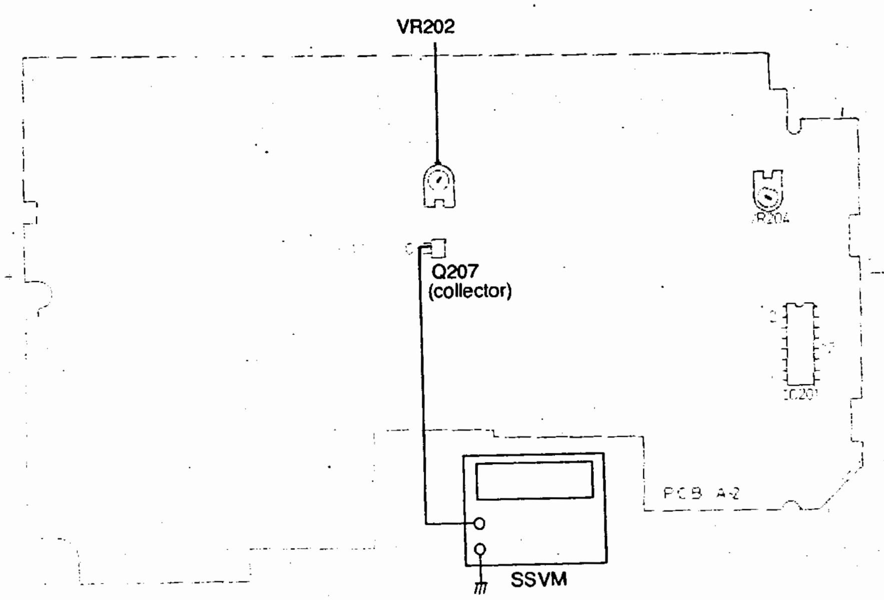
(1) ALIGNMENT FOR POWER SUPPLY VDD

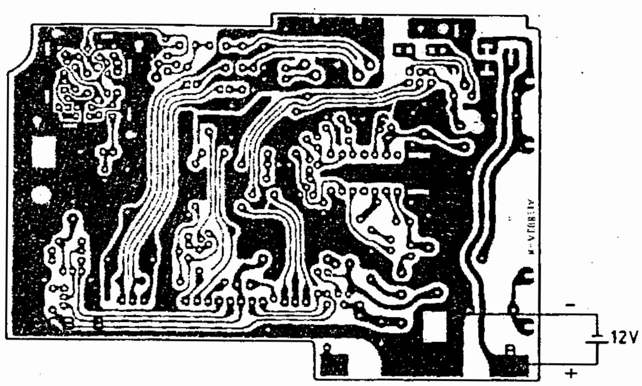
a. Required Instrument
SSVM

b. Alignment Procedure

Adjustment	Procedure
	(1) Set the power switch of the radio to OFF position.
	(2) Connect a power supply of 12V DC between point A and point B.
	(3) Connect test probes of the SSVM to the collector terminal of Q207 and ground.
VR202	(4) Adjust VR202 to have a reading on SSVM between 2.95—3.05V.

c. Instrument Connection





(2) ALIGNMENT FOR CLOCK TIME ACCURACY

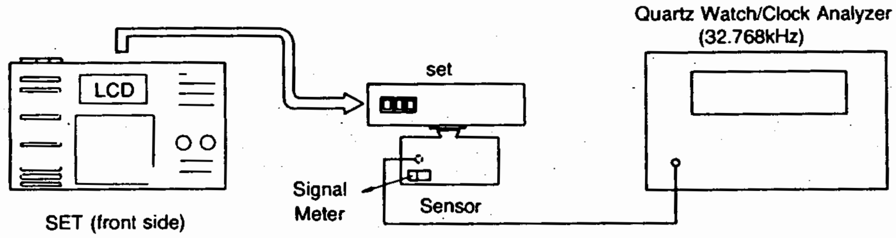
a. Required Instruments

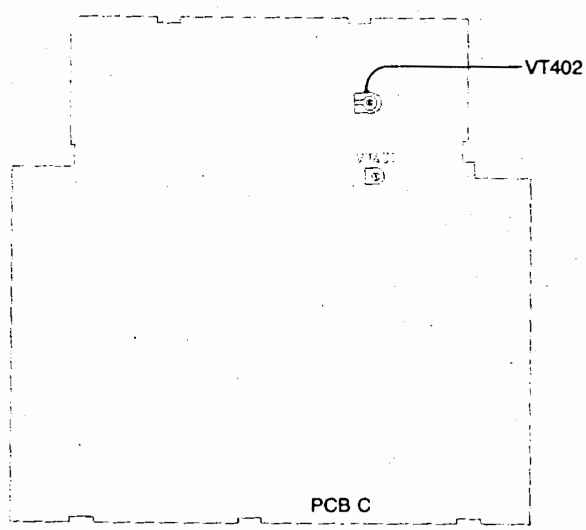
Quartz Watch/Clock Analyzer and Sensor

b. Alignment Procedure

Adjustment	Procedure
VT402	(1) Set the power switch of the radio to OFF position. (2) Put the LCD of the set near the Sensor of Quartz Watch/Clock Analyzer and move the set to the position where the max. signal is reached. (3) Adjust VT402 to reach the range of zero error(±7 PPM or ±20 sec/month) on Quartz Watch/Clock Analyzer.

c. Instrument Connection





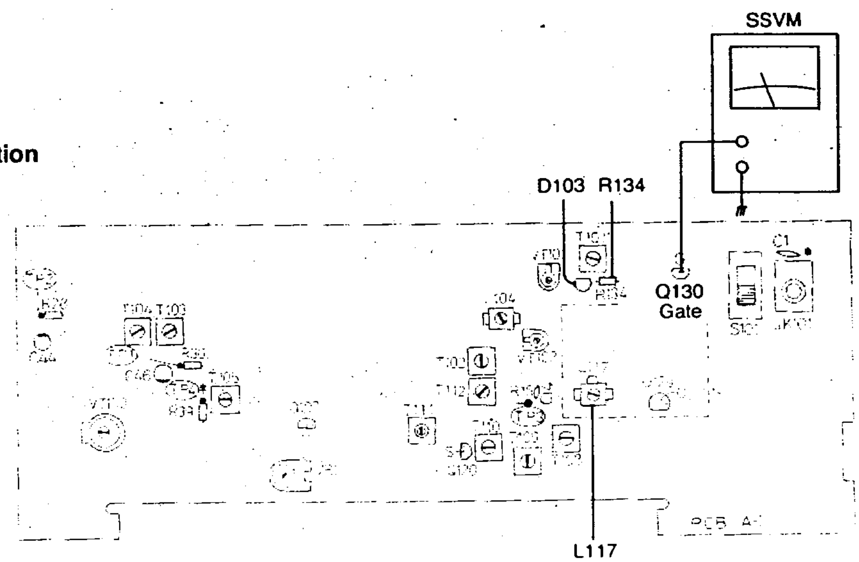
(3) ALIGNMENT FOR VC01 VOLTAGE RANGE

a. Required Instrument
SSVM

b. Alignment Procedure

Mode	Adjustment	Procedure
		(1) Set the power switch to ON position.
		(2) Set "FM 108MHz".
		(3) Connect a SSVM to the gate of Q130.
FM	L117	(4) Adjust L117 to have a reading on SSVM between 9.2V—9.5V (when D103 is FC-52M5 and R134 is 330K ohm).
	L117	(5) Adjust L117 to have a reading on SSVM between 10.3V—10.7V (when D103 is FC - 52M6 and R134 is 390K ohm).

c. Instrument Connection



(4) ALIGNMENT FOR PLL FREQUENCY

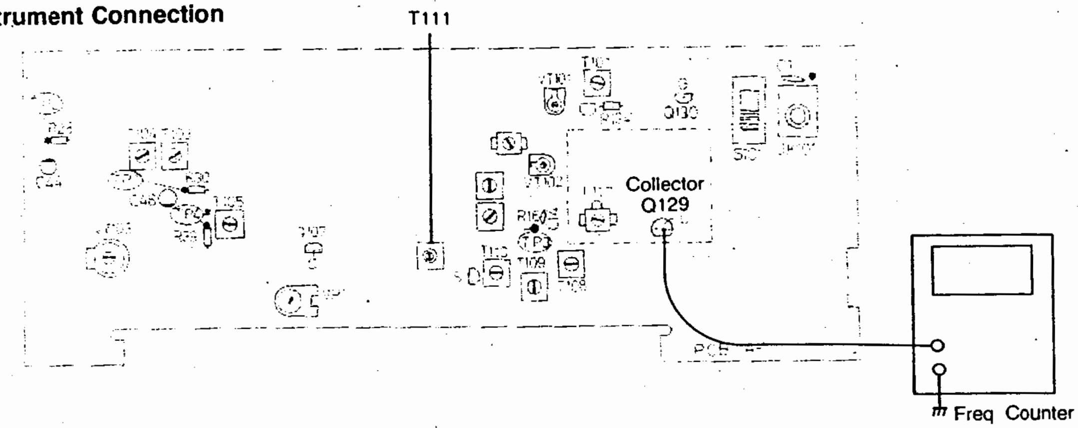
a. Required Instrument

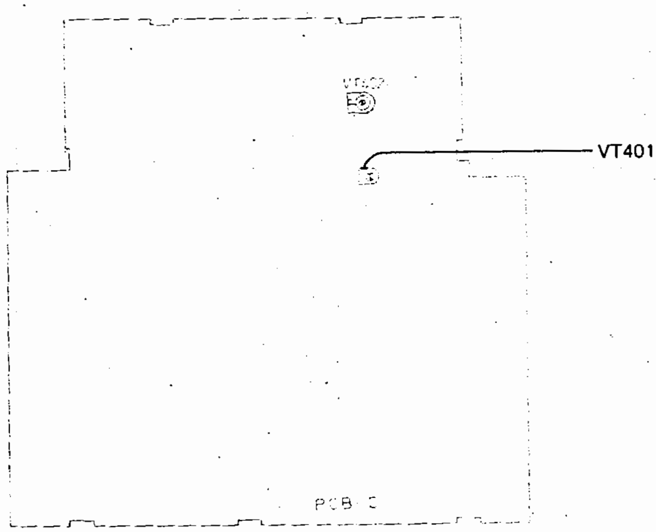
Frequency Counter

b. Alignment Procedure

Mode	Adjustment	Procedure
FM		(1) Set the power switch to ON position.
		(2) Select the tuner frequency at 108MHz.
		(3) Connect the test probes of frequency counter to the collector of Q129 and ground. The ground point should be as near as possible to the collector.
	VT401	(4) Adjust VT401 to have a reading of 118.7000MHz—118.7003MHz.

c. Instrument Connection





(5) ALIGNMENT FOR AM 2ND LOCAL OSC

a. Required Instrument

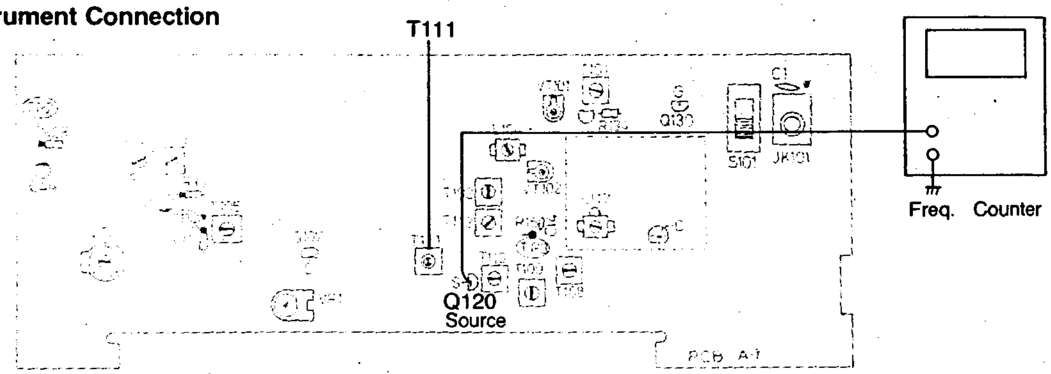
Frequency counter

b. Alignment Procedure

Mode	Adjustment	Procedure
AM (BFO switch OFF)		(1) Set the power switch to ON position.
		(2) Connect the test probes of frequency counter to the source of Q120 and ground.
	T111	(3) Adjust T111 to have a reading of 55.3953MHz—55.3961MHz.

CAUTION: A loading effect could emerge in the circuit due to the inserted test probe of frequency counter. A reasonable reading of the frequency counter in step 2 should be higher than 55.395MHz.

c. Instrument Connection



(6) ALIGNMENT FOR AM 2ND IF

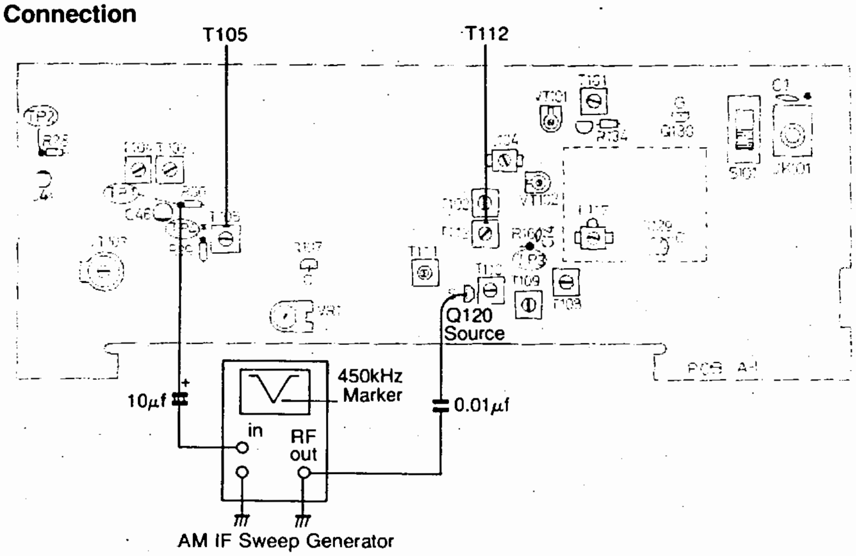
a. Required Instrument

AM IF Sweep Generator with scope

b. Alignment Procedure

Mode	Adjustment	Procedure
AM (BFO switch OFF)		(1) Set the power switch to ON position.
		(2) Connect the input terminal of AM IF sweep generator in series with a capacitor of 10μF to the test point C46(TP1) and R30.
		(3) Connect the RF output terminal of AM IF sweep generator in series with a capacitor 0.01μF to the source of Q120.
	T112	(4) Adjust T112 to have a max. output with a marker frequency of 450kHz on the sweep scope.
	T105	(5) Adjust T105 to have a max. output with a marker frequency of 450kHz on the sweep scope.
		(6) Repeat (4) and (5) until a max. 450kHz output is reached.

c. Instrument Connection



(7) ALIGNMENT FOR FM IF

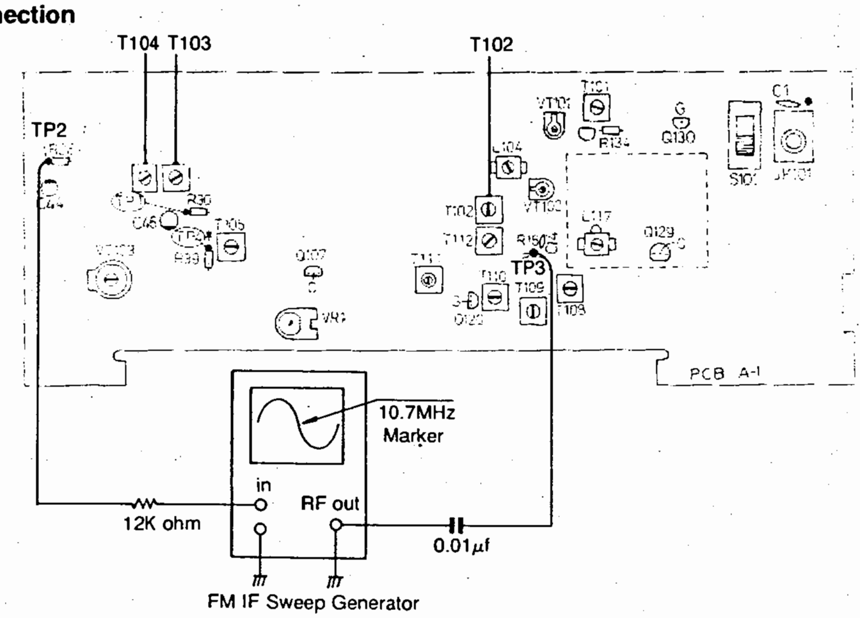
a. Required Instrument

FM IF Sweep Generator with Scope

b. Alignment Procedure

Mode	Adjustment	Procedure
FM		(1) Set the power switch to ON position.
		(2) Connect the input of FM IF sweep generator in series with a resistor of 12K ohm to the test point between R28 and C44 (TP2).
		(3) Connect the RF output of FM IF sweep generator to the test point between C14 and R16 (TP3).
	T102 T103 T104	(4) Adjust T102, T103, and T104 to have a max. output and best symmetrical S curve with respect to the center marker frequency of 10.7MHz.

c. Instrument Connection



(8) ALIGNMENT FOR AM SENSITIVITY

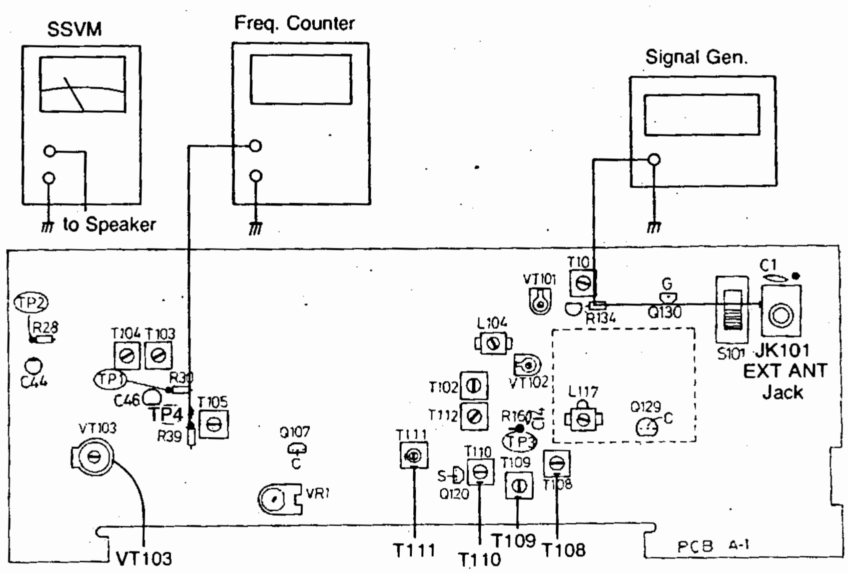
a. Required Instruments

Signal Generator
SSVM
Frequency counter

b. Alignment Procedure

Mode	Adjustment	Procedure
AM		(1) Set the power switch to ON position.
		(2) Set the band to SW, BFO switch to OFF and ANT Switch to EXT position.
		(3) Feed a signal with modulation from signal generator output to EXT ANT jack, and connect a SSVM to speaker.
		(4) Tune the radio frequency exactly the same as that of signal generator.
	T108,T109,T110	(5) Adjust T108 and T109, T110 to have a max. audio output.
		(6) Repeat processes (4) and (5) until a max. audio output is reached.
		(7) Connect the probe of frequency counter at the test point between R39 and D107 (TP4).
	T111	(8) Adjust T111 to meet the specification frequency 450kHz±0.2kHz.

c. Instrument Connection



(9) ALIGNMENT FOR BFO

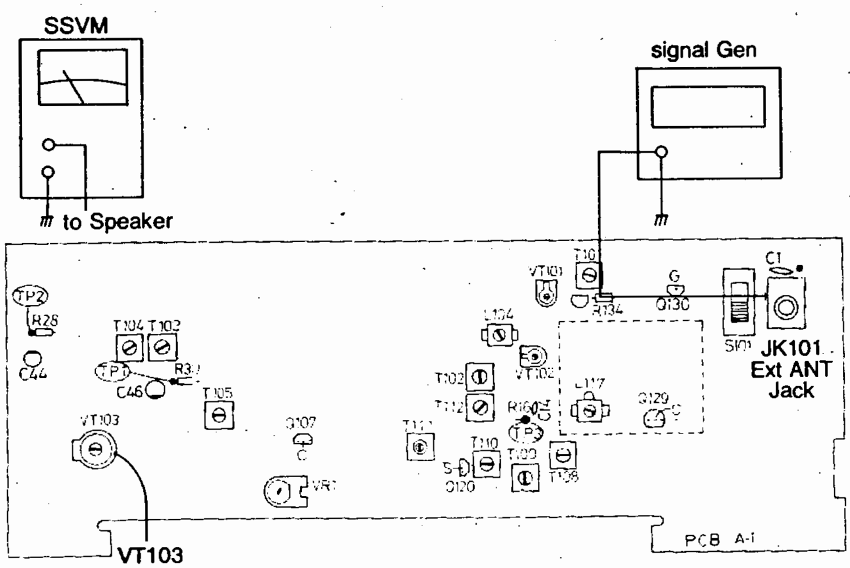
a. Required Instruments

Signal Generator
SSVM

b. Alignment Procedure

Mode	Adjustment	Procedure
AM		(1) Set the power switch to ON position.
		(2) Set the band to SW, BFO switch to ON and BFO pitch to center position.
		(3) Feed a signal without modulation from signal generator to EXT ANT jack, and connect a SSVM to the speaker.
		(4) Tune the radio frequency exactly the same as that of signal generator.
	VT103	(5) Adjust VT103 to have a minimum reading on SSVM.

c. Instrument Connection



(10) ALIGNMENT FOR SIGNAL LEVEL AND STOP LEVEL

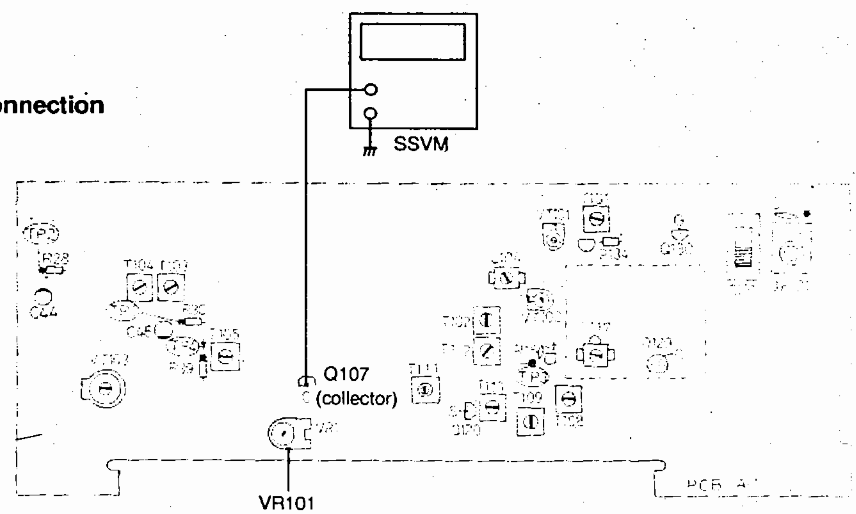
a. Required Instrument

SSVM

b. Alignment Procedure

Mode	Adjustment	Procedure
AM		(1) Set the power switch to ON position.
		(2) Set the band frequency to 26100kHz and BFO switch to OFF.
		(3) Connect the SSVM to the collector of Q107.
	VR101	(4) Adjust VR101 to have a reading of 1.95V—2.05 V.

c. Instrument Connection



(11) ALIGNMENT FOR MPX

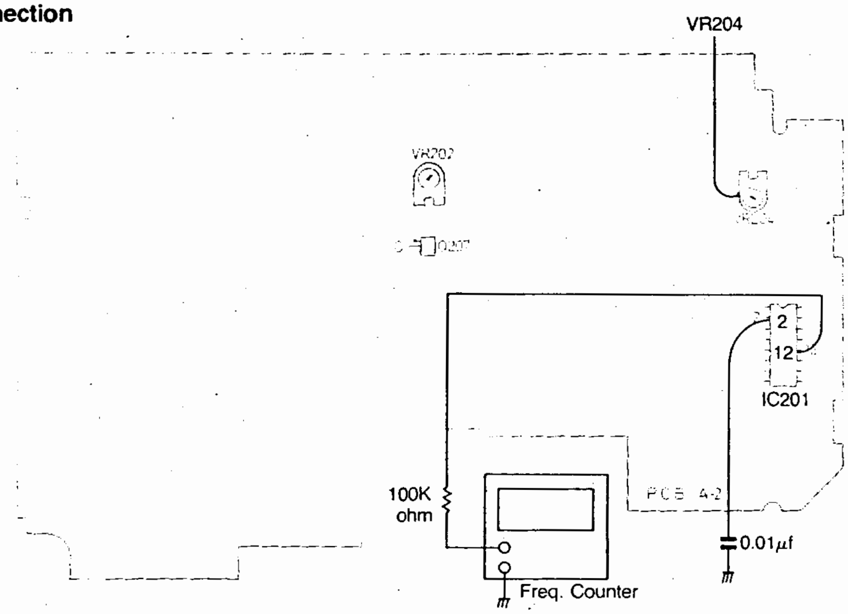
a. Required Instrument

Frequency Counter

b. Alignment Procedure

Mode	Adjustment	Procedure
FM		(1) Set the power switch to ON position.
		(2) Set the FM mode switch to STEREO position.
		(3) Connect the pin 2 of IC201 in series with a capacitor of 0.01μF to ground.
		(4) Connect a frequency counter in series with a resistor of 100K ohm to the pin 12 of IC201.
	VR204	(5) Adjust VR204 to have a reading of 19kHz on frequency counter.

c. Instrument Connection



(12) ALIGNMENT FOR FM SENSITIVITY

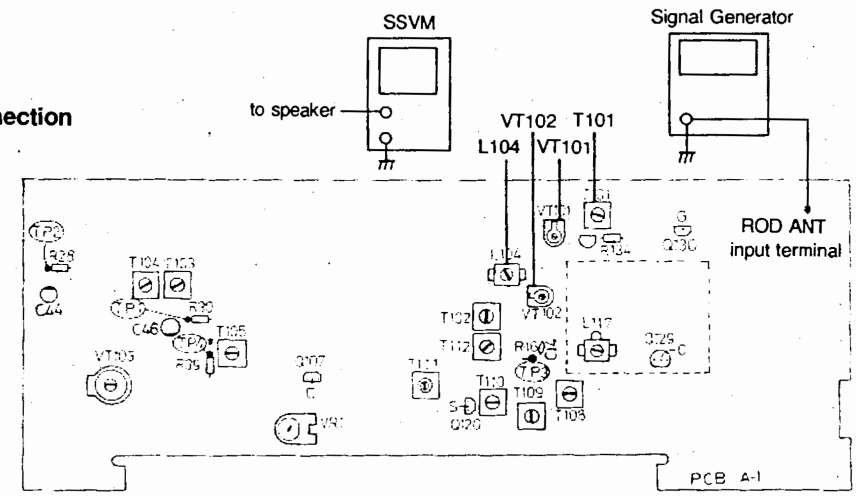
a. Required Instruments

Singal Generator
SSVM

b. Alignment Procedure

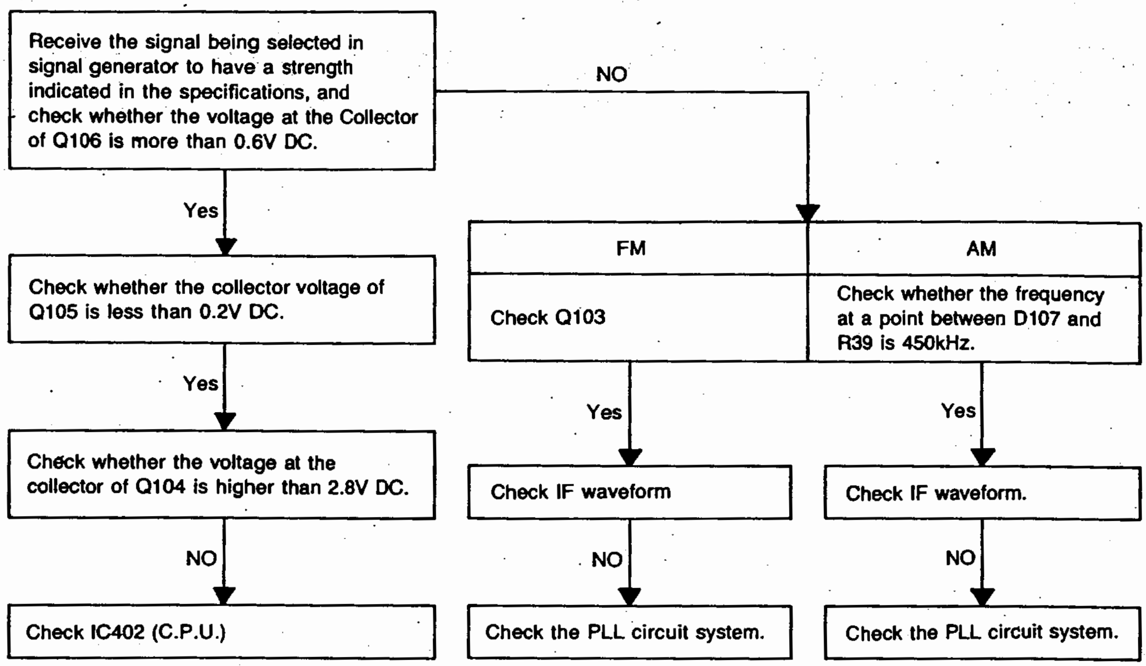
Mode	Adjustment	Procedure
		(1) Set the power switch to ON position.
		(2) Connect a SSVM to the speaker.
		(3) Connect a signal generator to the input terminal of Rod Ant.
		(4) Set the band to FM, RF Gain to MAX and frequency deviation to 22.5kHz with 1kHz modulation.
FM	L104, T101	(5) Tune the band frequency to 90MHz and adjust L104, T101 to have a max. reading on SSVM.
	VT102 VT101	(6) Return the band frequency to 106MHz and adjust VT102, VT101 to have a max. reading on SSVM.
		(7) Repeat (5) and (6) until a best sensitivity on these two frequencies are formed.

c. Instrument Connection

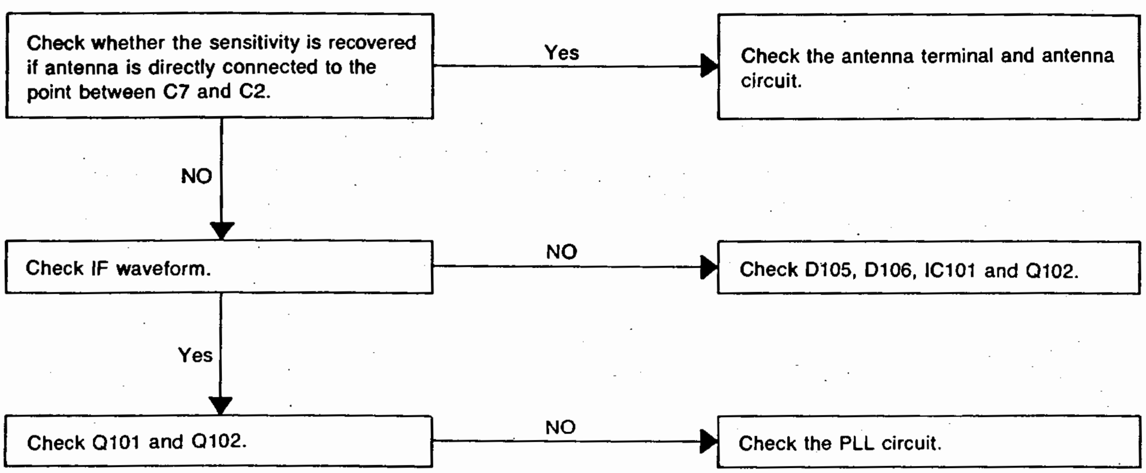


TROUBLESHOOTING FLOW CHART

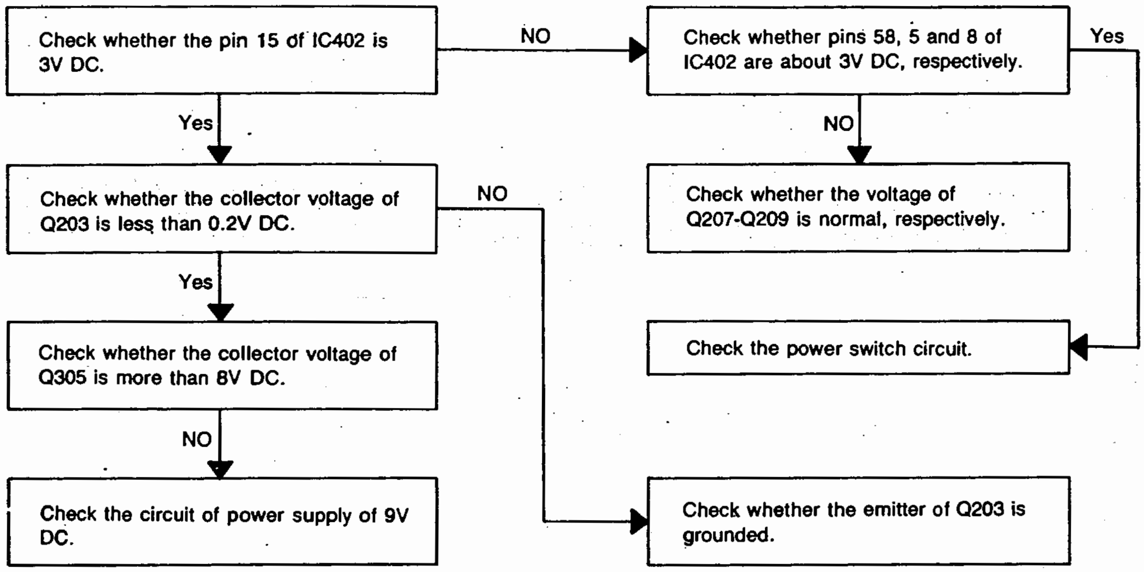
1. Scan auto stop does not work



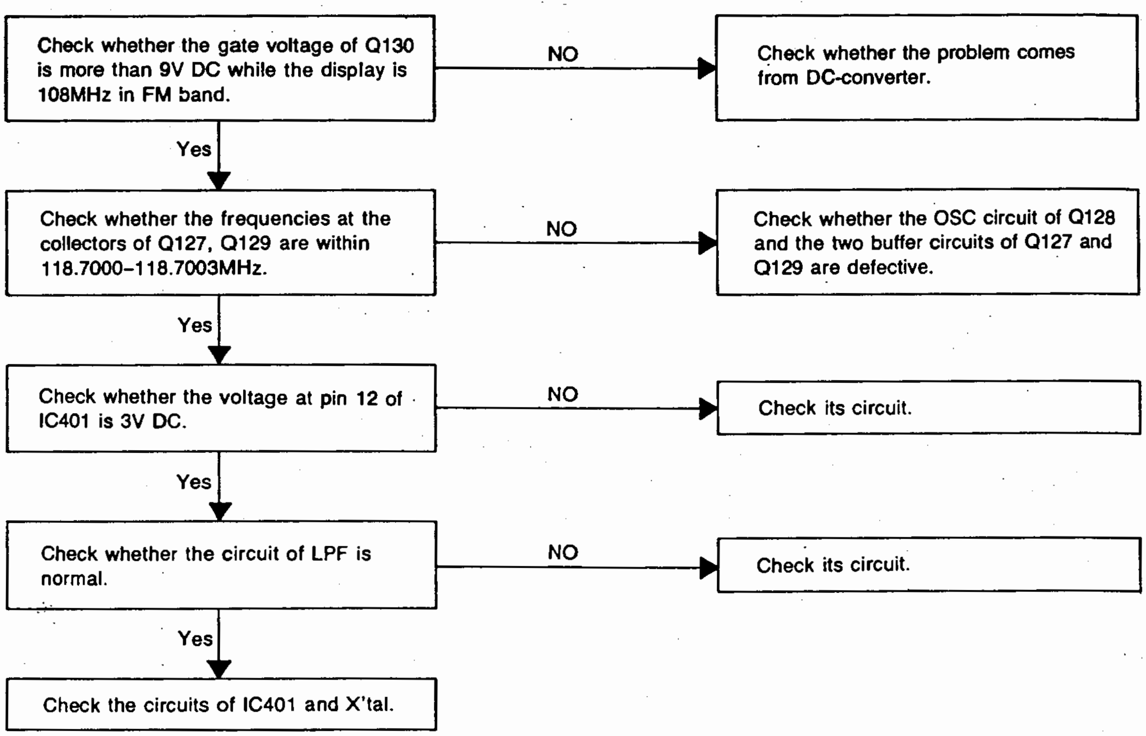
2. Weak sensitivity on FM mode



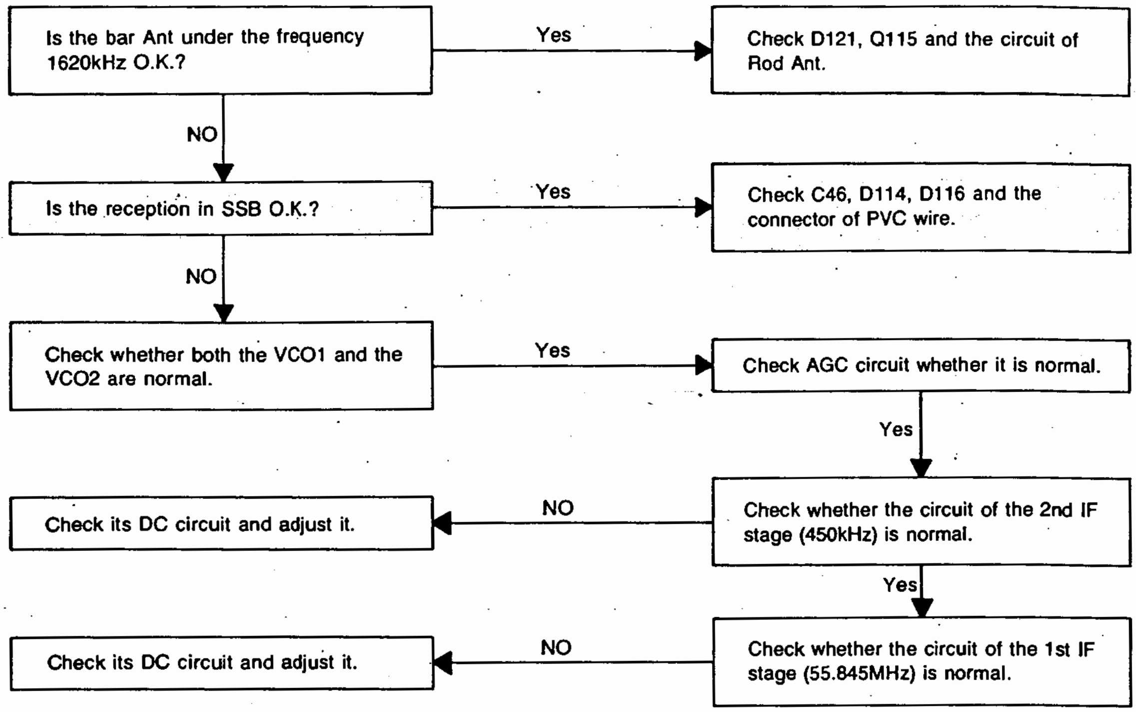
3. Power can not be turned on



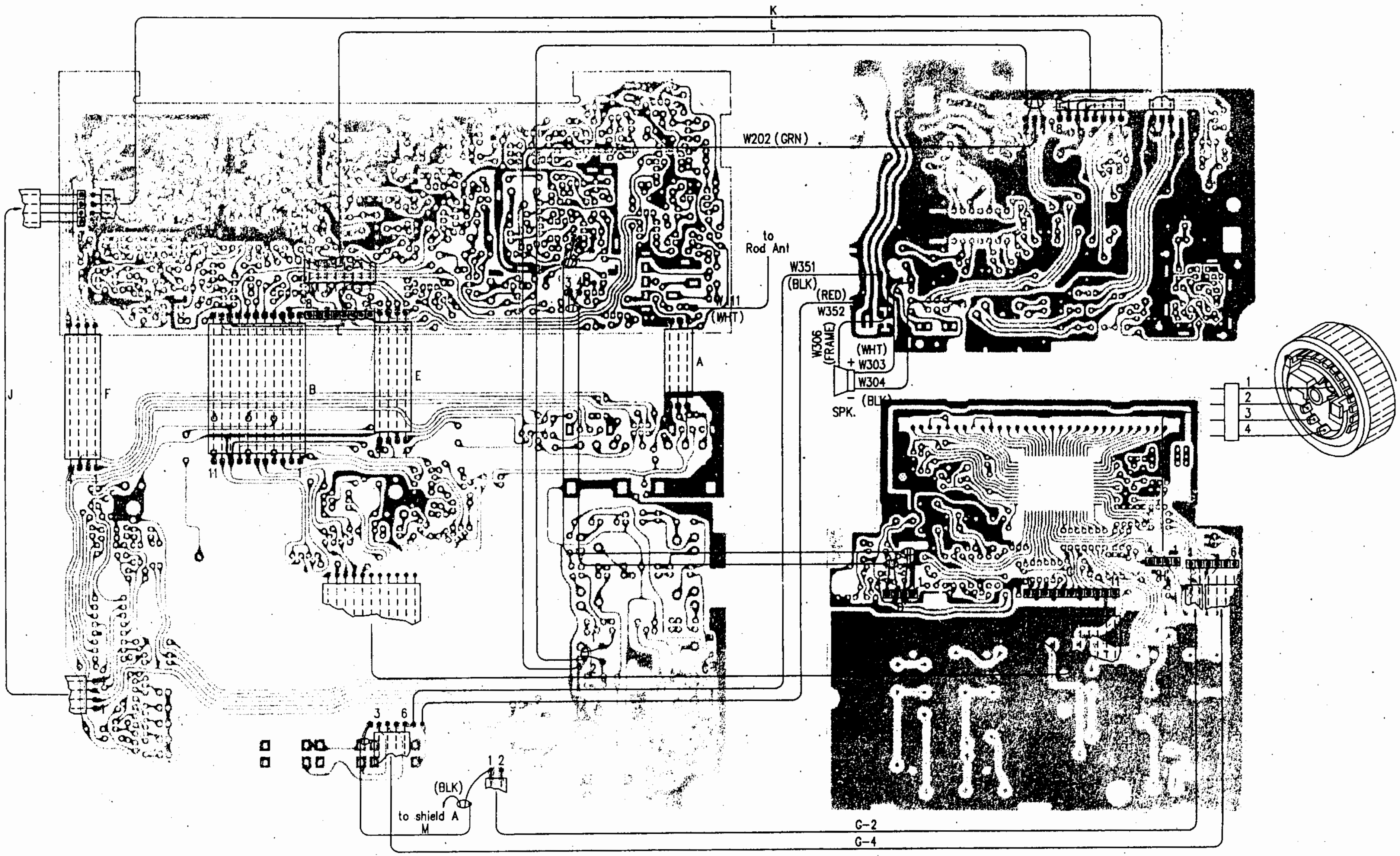
4. PLL does not work



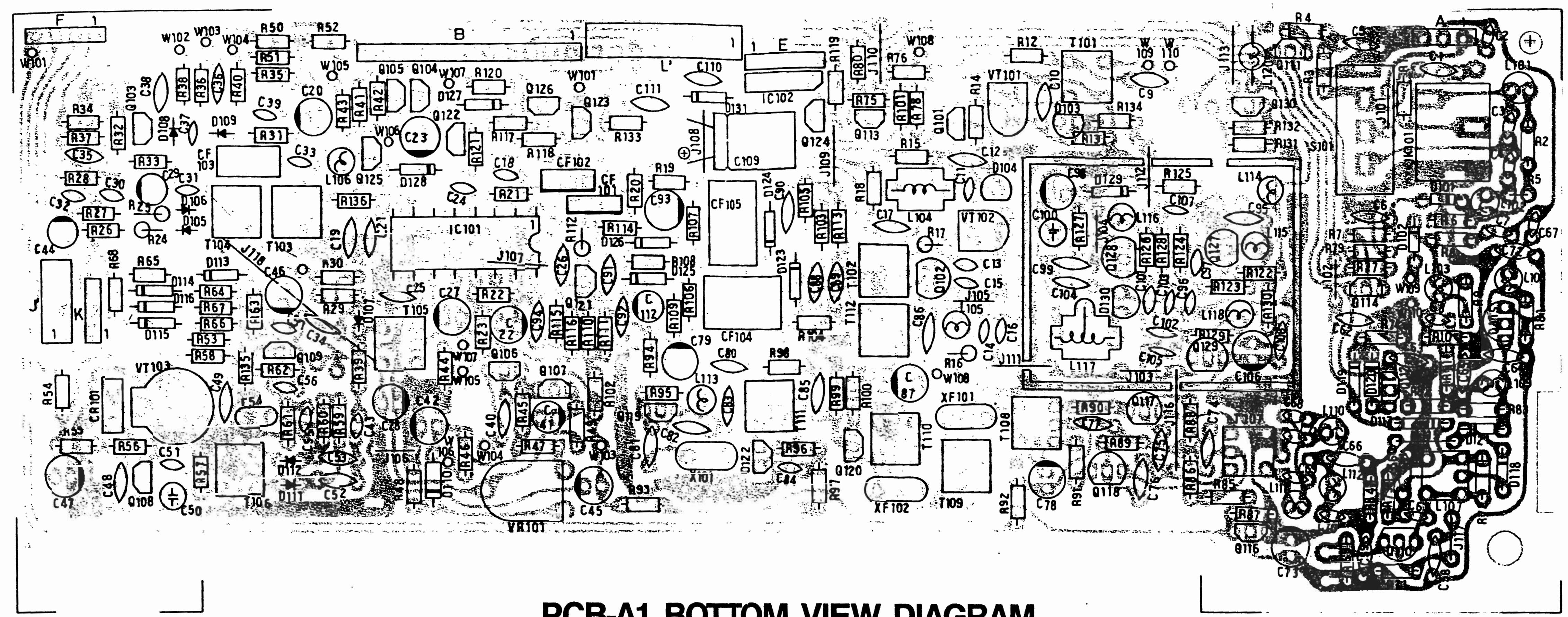
5. Weak sensitivity in AM band.



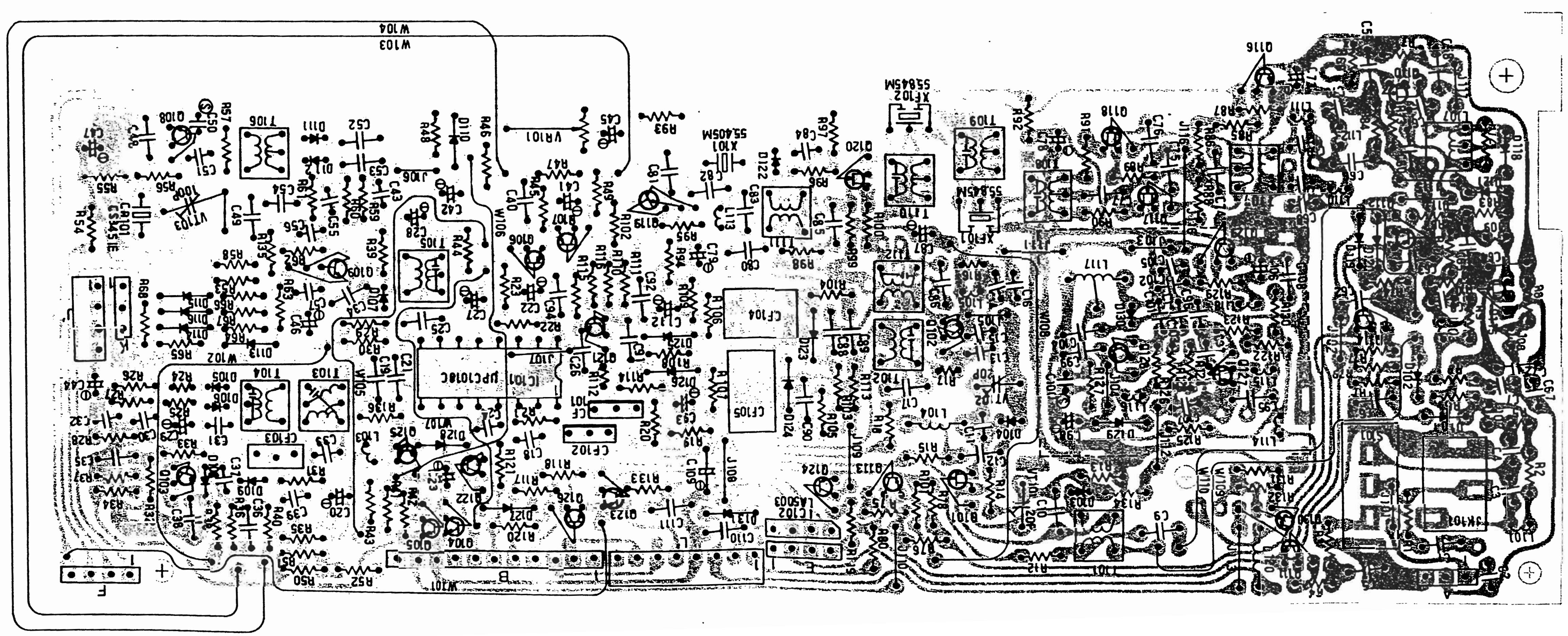
WIRING DIAGRAM-SOLDER SIDE



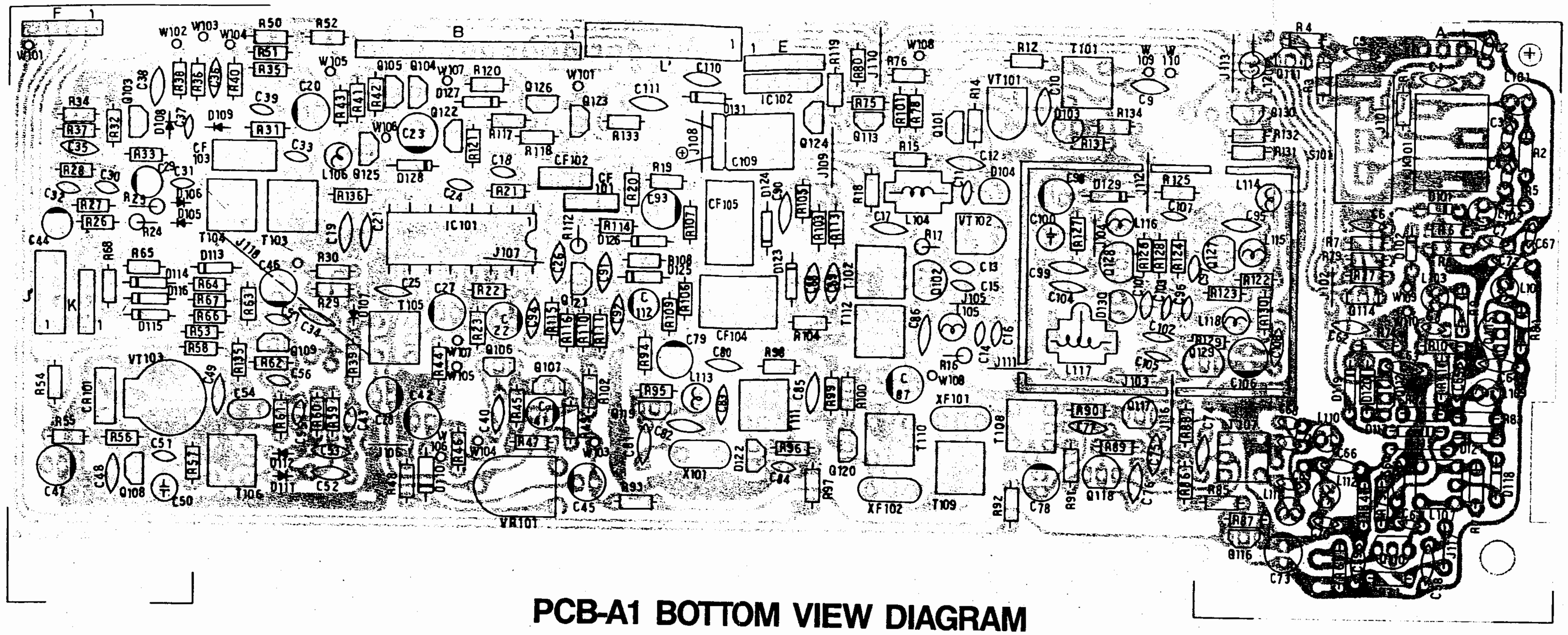
PCB-A1 TOP VIEW DIAGRAM



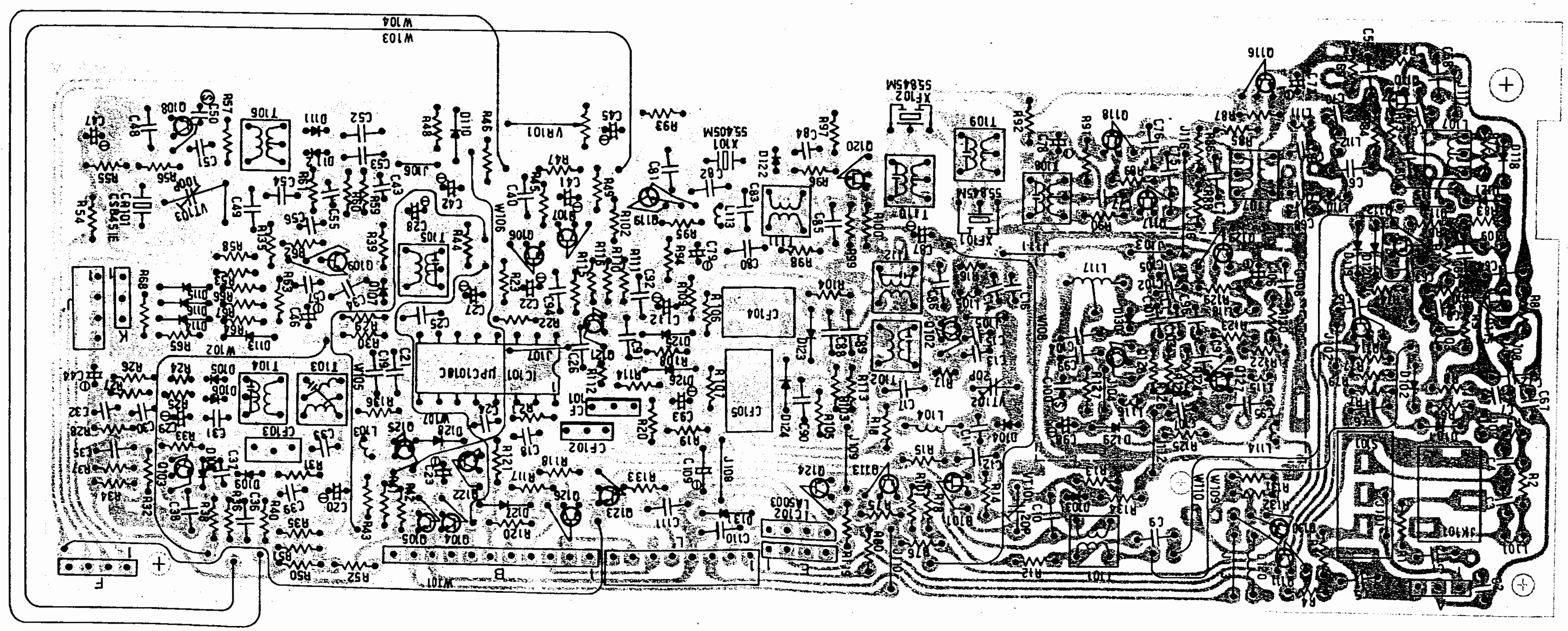
PCB-A1 BOTTOM VIEW DIAGRAM



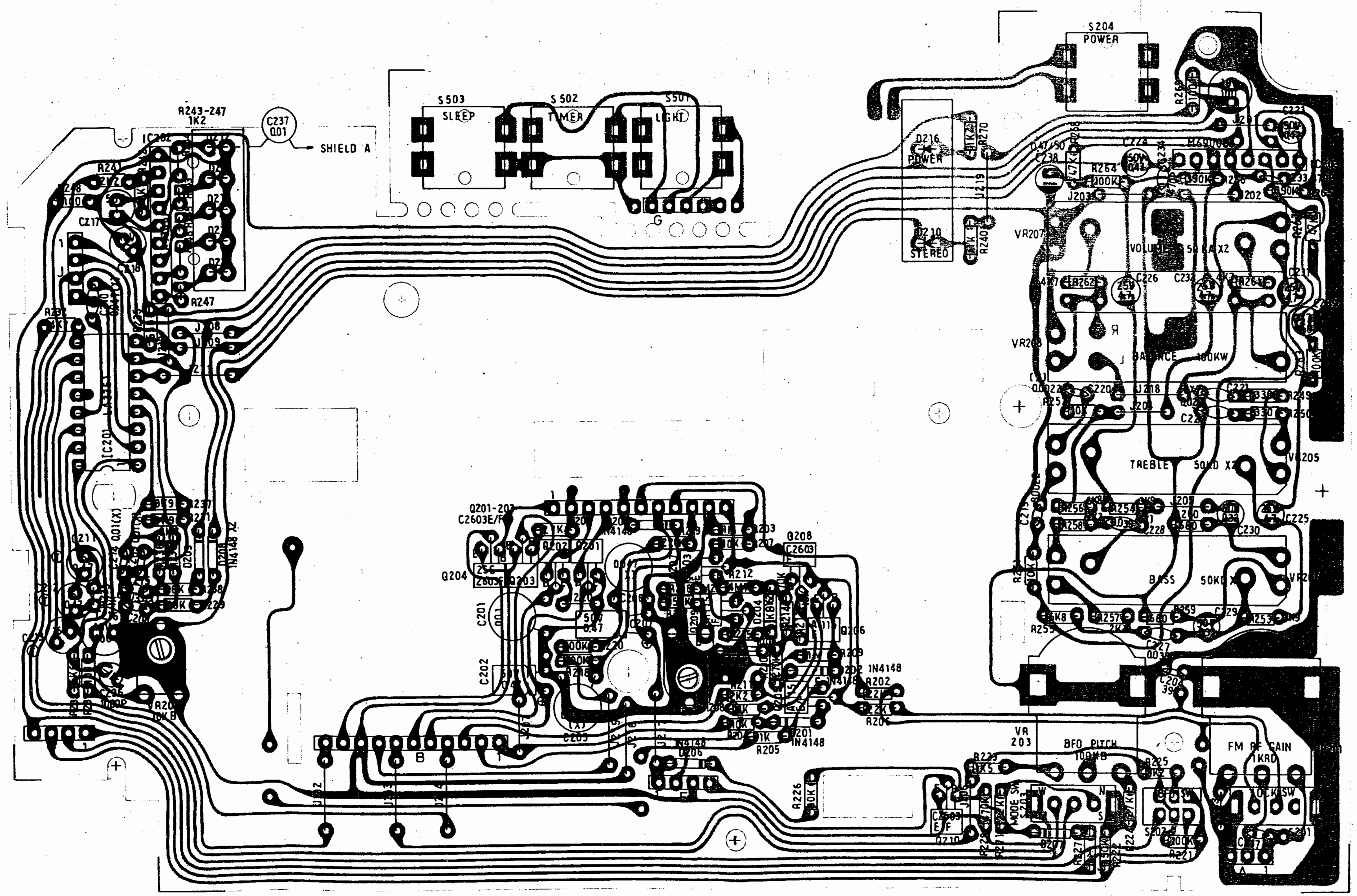
PCB-A1 TOP VIEW DIAGRAM



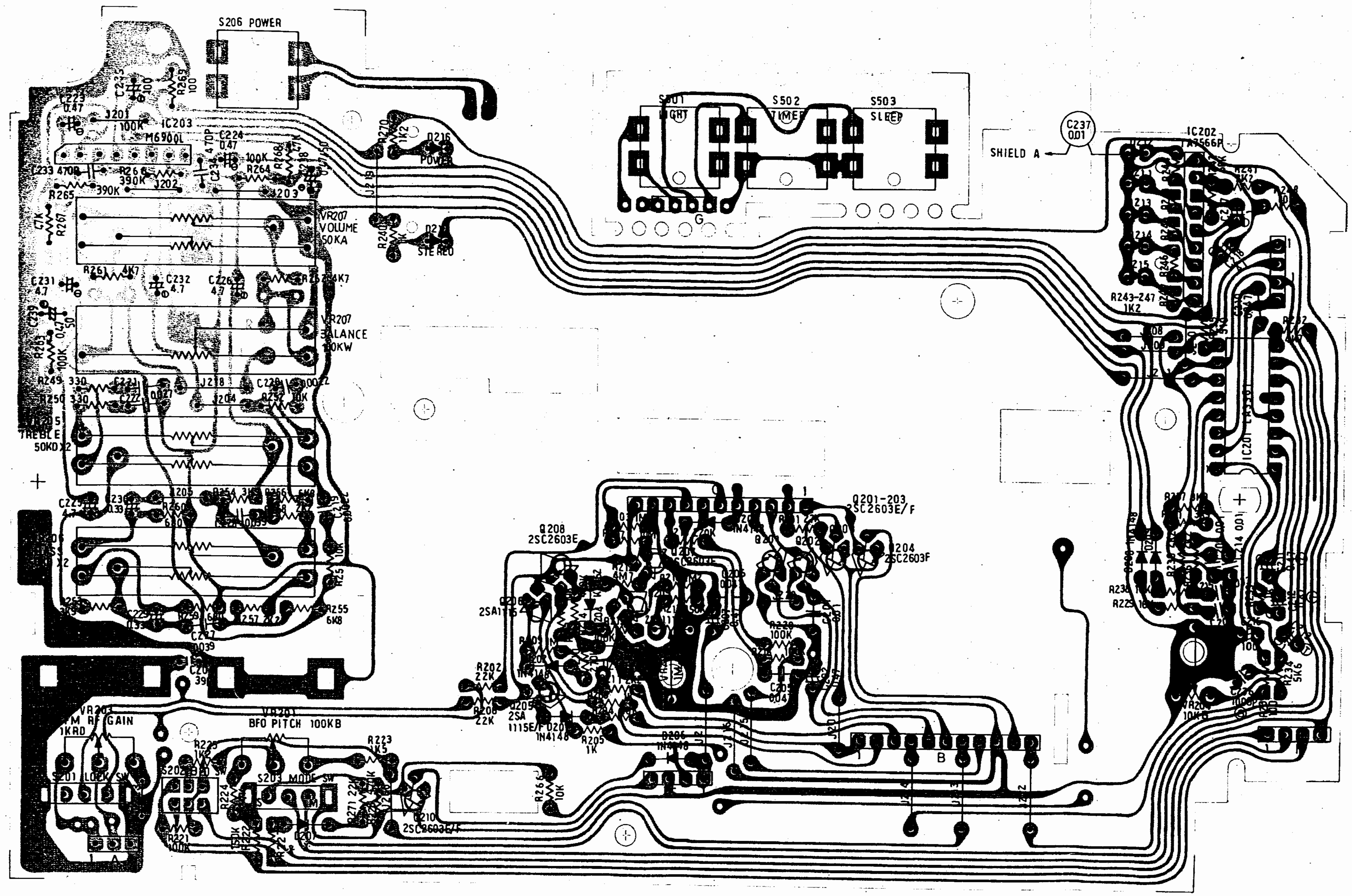
PCB-A1 BOTTOM VIEW DIAGRAM



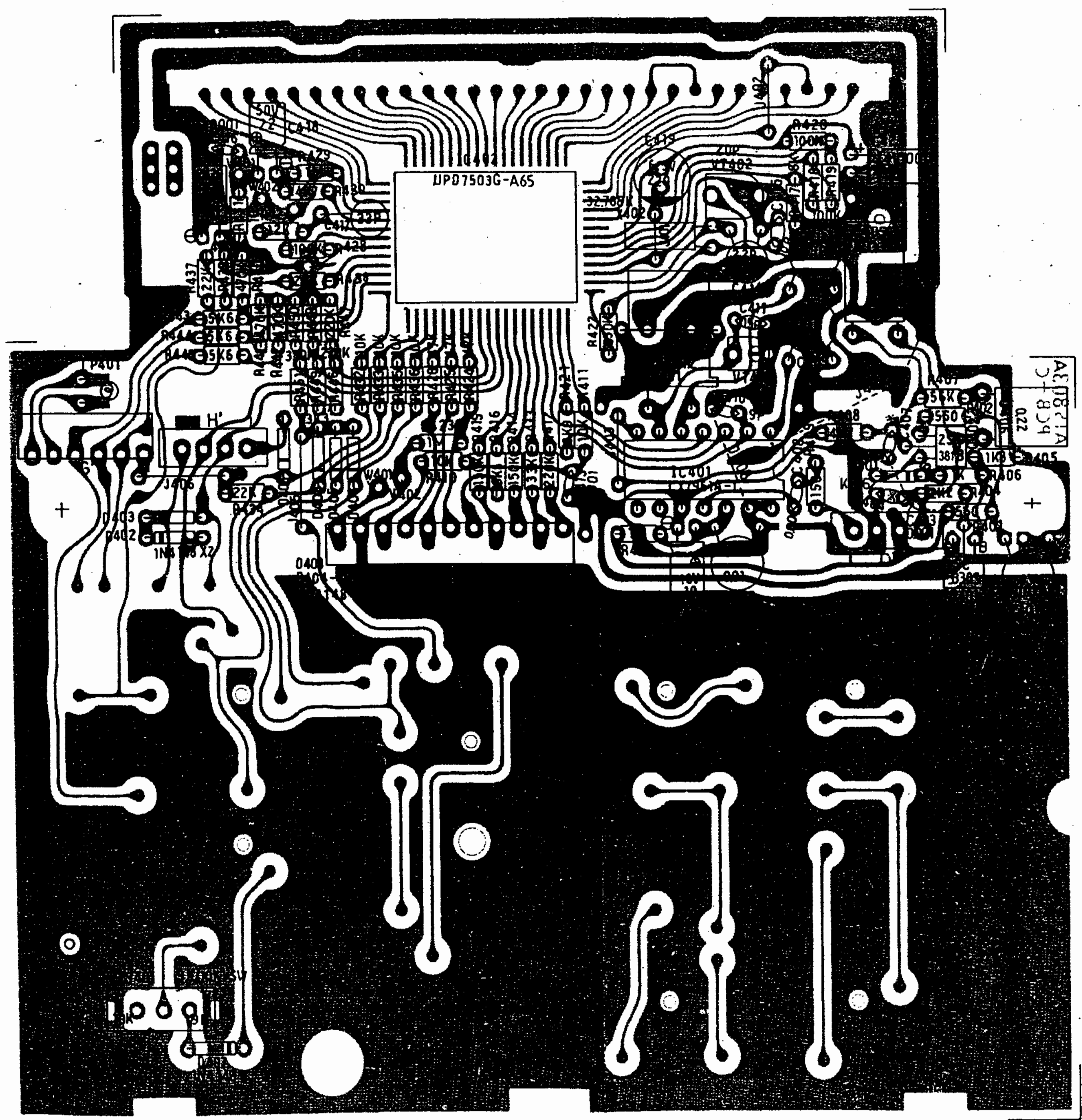
PCB-A2 & A3 TOP VIEW DIAGRAM



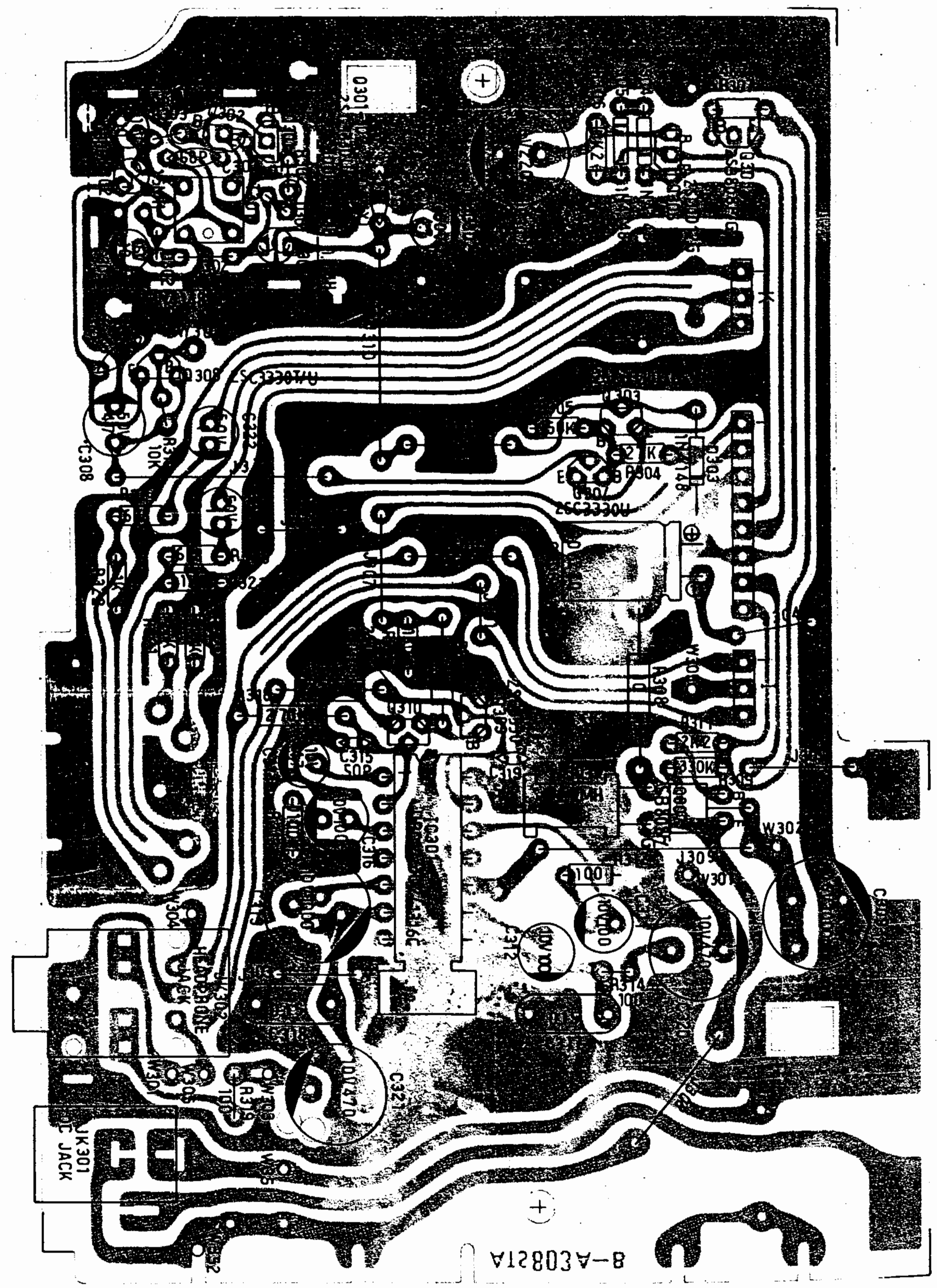
PCB-A2 & A3 BOTTOM VIEW DIAGRAM



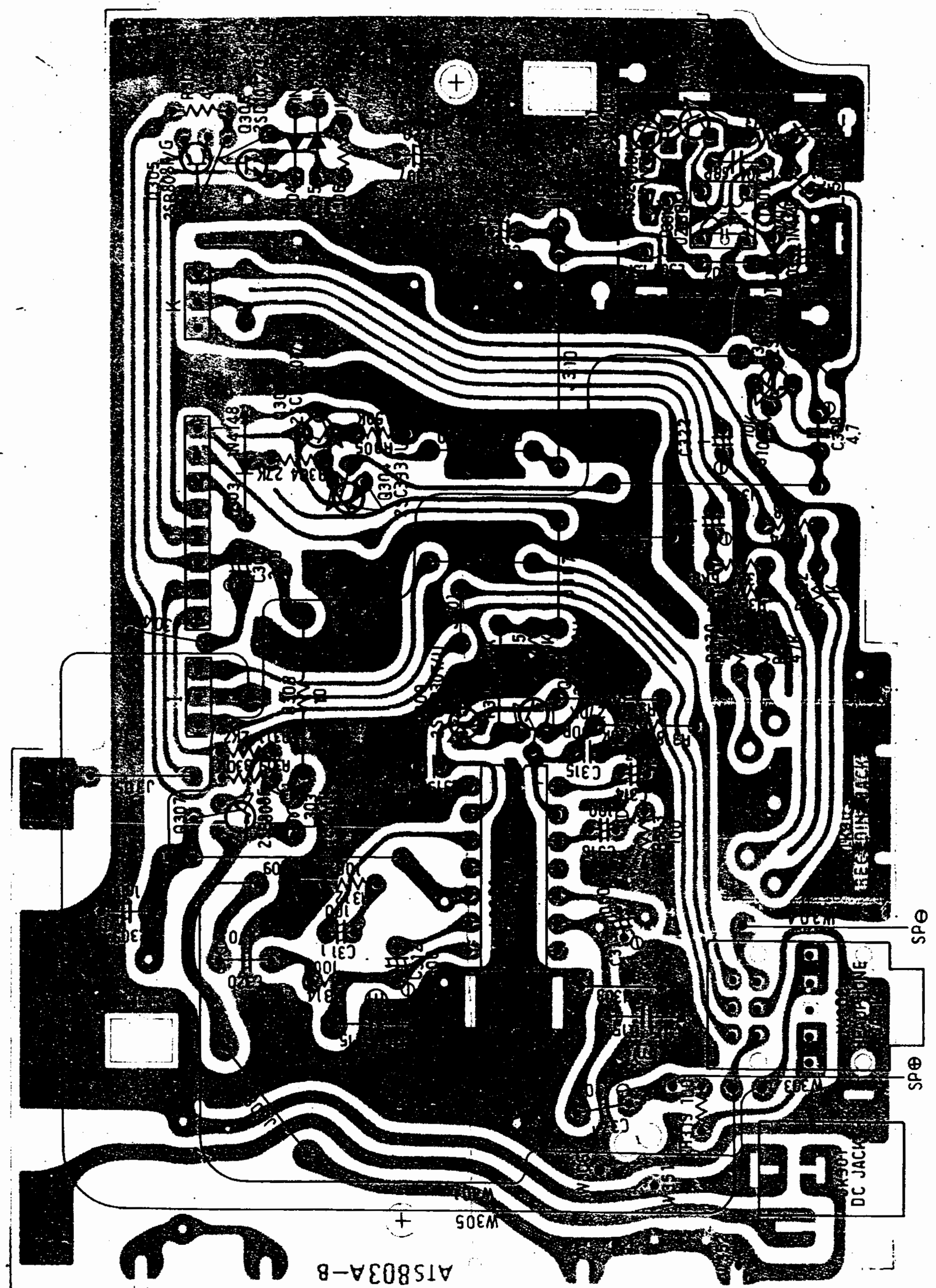
PCB-C TOP VIEW DIAGRAM



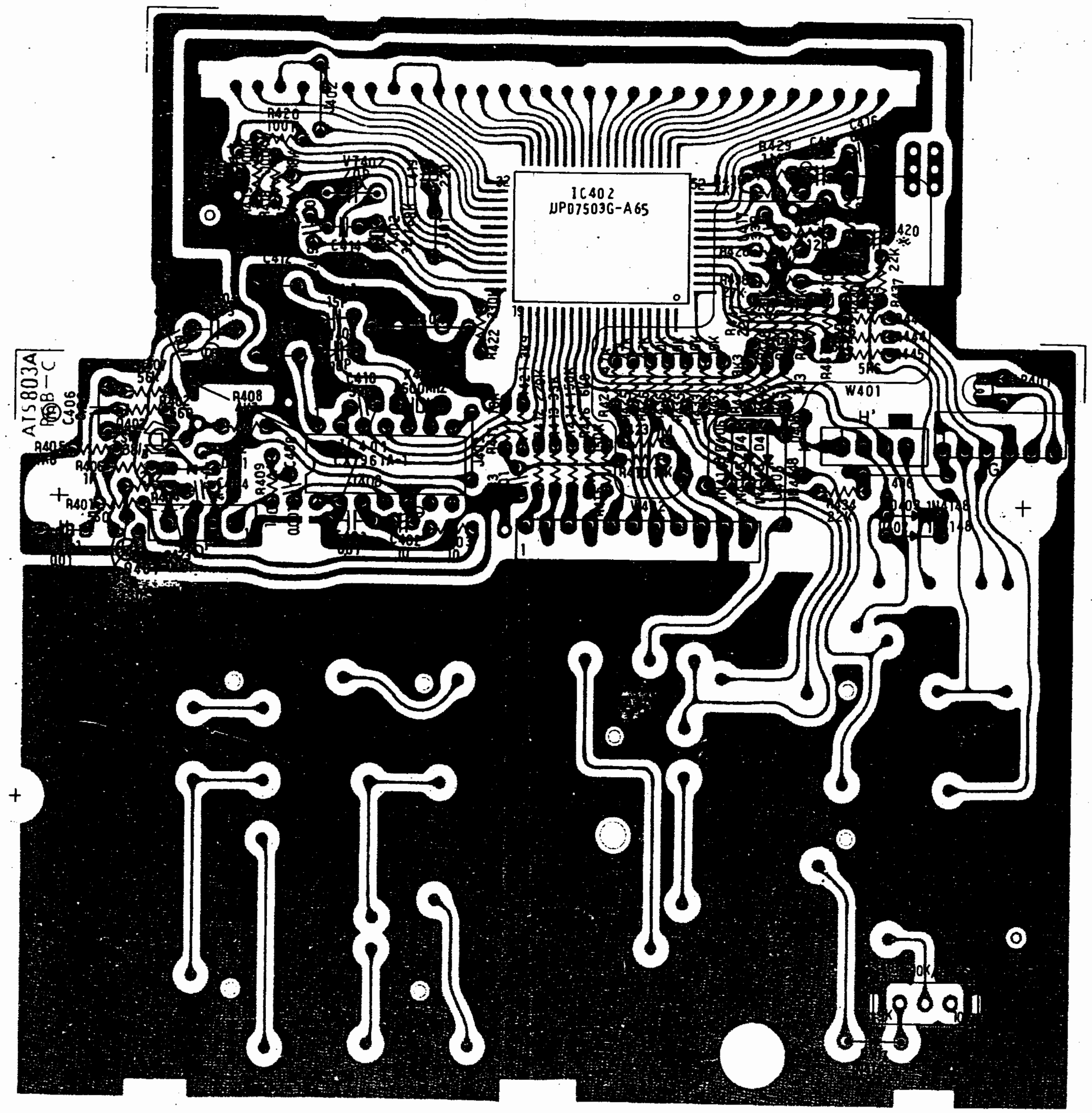
PCB-B TOP VIEW DIAGRAM



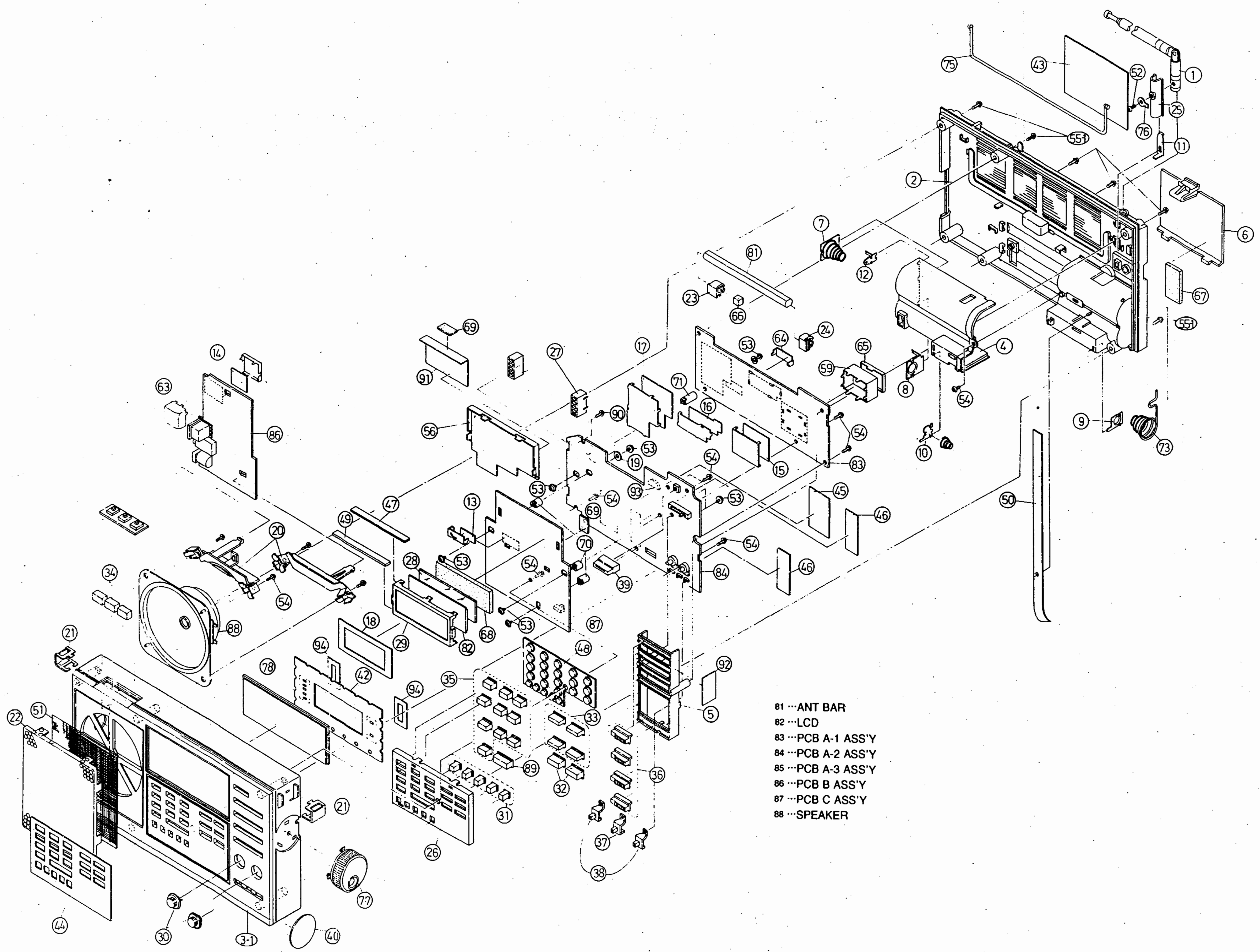
PCB-B BOTTOM VIEW DIAGRAM



PCB-C BOTTOM VIEW DIAGRAM



EXPLODED VIEW



81 ···ANT BAR
82 ···LCD
83 ···PCB A-1 ASS'Y
84 ···PCB A-2 ASS'Y
85 ···PCB A-3 ASS'Y
86 ···PCB B ASS'Y
87 ···PCB C ASS'Y
88 ···SPEAKER

PARTS LIST FOR EXPLODED VIEW

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
1	ANT. BAR ATS-803, 7 SECTIONS		2118000
2	CABINET, BACK, BLACK, PLASTIC		2018002
3-1	CABINET, FRONT, BLACK, PLASTIC		3011843
22	GRILL, SPEAKER, BLACK		2118240
78	WINDOW, LCD, TRANSPARENT		2018120
44	PLATE, FUNCTION, BLACK, PLASTIC		3211850
51	SALON, NET		2318040
4	CASE, BATTERY		2018031
5	CHASSIS, MIDDLE		2018020
6	COVER, BATTERY, BLACK, PLASTIC		2018010
7	CONDUCTOR, BATTERY (−) ASS'Y		2118010
8	CONDUCTOR, BATTERY (+)		2118200
9	CONDUCTOR, BATTERY A		2104030
10	CONDUCTOR, BATTERY C		2104050
11	CONDUCTOR, ROD ANT		2118040
12	CONDUCTOR, POWER		2118051
13	FIBER, SHIELD(B)		2218010
14	FIBER, SHIELD(C)		2218020
15	FIBER, SHIELD(E)		2218030
16	FIBER, SHIELD(F)		2218040
17	FIBER, SHIELD(G)		2218050
18	FIBER, DISPLAY HOLDER		2218080
19	FIBER, WASHER 2.6ϕ		9991026
20	FIXER, SPEAKER		2018050
21	FIXER, STRAP		2118060
23	HOLDER, ANT BAR(L)		2018070
24	HOLDER, ANT BAR(R)		2018080
25	HOLDER, ROD ANT		2018100
26	HOLDER, KEYBOARD		2018040
27	HOLDER, LED		2018061
28	ILLUMINATOR, LCD		2018110
29	HOLDER, DISPLAY		2118080
30	KNOB, ADJUSTMENT (RF/BFO), DARK GREY		3101841
89	KNOB, EXECUTE, DARK GREY		3171841
31	KNOB, FUNCTION (BAND), DARK GREY		3141841
32	KNOB, FREQ. UP-DOWN, DARK GREY		3151841
33	KNOB, MODE/STORE/SCAN/RECALL, DARK GREY		3161841
34	KNOB, LIGHT/TIMER/SLEEP, DARK GREY		3131841
35	KNOB, 0-9, DARK GREY		3121841
36	KNOB, VOLUME/BAL./FRQ./BRASS, DARK GREY		3111841
37	KNOB, BFO(OUT/IN), DARK GREY		3091841
38	KNOB, STEREO/MONO/LOCK, DARK GREY		3081841
39	KNOB, POWER, DARK GREYW/WHITE LINE		3181841
40	LATCH, TUNING KNOB		2318030
41	PLATE, DIN. JACK DUST		3241800
42	PLATE, DIAL		3231845
43	PLATE, ID FOR USA		3221847(B)
	PLATE, ID FOR UK, AUSTRALIA, CANADA		3221848(B)
45	PLATE, INSULATOR PVC A		2218061
46	PLATE, INSULATOR PVC B		2218071
47	RUBBER, CONDUCT		2418010
48	RUBBER, KEYBOARD		2418000
49	RUBBER, SPACER		2418020
50	RIBBON		2218000

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
52	SCREW, M 3×6 P Ni		9020306
53	SCREW, M 2.6×4 PW Ni		9025204
54	SCREW, TP 2.6×8 P Ni		9120208
55-1	SCREW, TP 2.6×12 P Ni		9120212
90	SCREW, TP 2.6×8 B		9202208
91	SHEET, SHIELD		2218090
56	SHIELD(A)		2118091
59	SHIELD(D) ASS'Y		2118251
63	SHIELD, DC CONDUCTOR		2118160
64	SHIELD, IC		2118170
65	SHIELD CAP.		2118231
92	SHIELD, PAPER		2118270
66	SPONGE, ANT BAR FIXED		2318000
93	SHIELD, EVA 1/2		2338070
67	SPACER, BATTERY		2318010
68	SPONGE, LCD		2318020
69	SPONGE, LAMP		2318050
70	SPACER, PCB(5.4)		2118180
71	SPACER, PCB(12.4)		2118190
73	SPRING, BATTERY		2118030
75	SUPPORTER, FLIP STAND		2118070
76	TERMINAL, ANT		2118220
77	KNOB, TUNING 3 SPEED ASS'Y, BLACK		2518001
94	LED EVA		2318060
NOT SHOWN	SHOULDER STRAP ASS'Y		3751800
	INSTRUCTION BOOK, USA		3781862(B)
	INSTRUCTION BOOK, UK/AUST		3781863(A)
	INSTRUCTION BOOK, CANADA		3781864
	GIFT BOX, USA		3901860(B)
	GIFT BOX, UK/AUST		3901861(A)
	GIFT BOX, CANADA		3901862
	EXT. ANT. ASS'Y		2518011
	NAME PLATE		3211850
	LABEL SERIES NO.		2216010
	EXPORT CARTON		3961841
	POP STICKER		3461800
	POLYFORM (R)		3821800
	POLYFORM (L)		3821801
	PE BAG (D)		3701801
	PE BAG (E)		3705400
	HEAT-BONDING FILM		3711801
	WAVE HANDBOOK		3799900
	PVC CUSHION		3811800
	SHIELD (E) EVA		2318070

BEFORE ELECTRICAL PARTS LIST

Some of the parts in the Elec. Parts List have altermative values. The following is a guidance for choice upon repairing.

Repair Parts		Page	Associated Parts			Page
CF103	SFA10.7MF5K	40	C33	3pf	(CK)	38
			R31 R33	470 680	ohm ohm	41
IC101	μPC 1018C	40	R19 R20	560	ohm	41
IC201	LA3361	44	R28	12K	ohm	41
			R229 R238	18K 18K	ohm ohm	45
D130	FC52M-5	40	R134	330K	ohm	43
D204	KB162	44	R215	100K	ohm	45
X402	32.768kHz	48	C415	15pf	(CH)	48
Q110	2SK152-2	43	R71	220	ohm	42
Q110 Q115 Q117-118	2SK152	43	R87	47K	ohm	42

Explanation:

1. If CF103 is demaged and changed, the associated parts, C33, R31, and R33 should be changed accordingly at the same time, their values should be subject to the values described above.
2. If C33 is demaged when its spec. is 7pf, it has to be replaced with another new 7pf. CF103, R31 and R33 remain unchanged.
3. If any one of Q110, Q115, Q117 or Q118 is demaged and changed, the associated part R87 should be replaced with 47K ohm accordingly at the same time.
4. If only R87 is demaged, replace it only with same value as original. Q110, Q115, Q117 and Q118 remain unchanged.

ELECTRICAL PARTS LIST

REF. NO.	DESCRIPTIONS					RS LOCATION NO.	MFR. PART NO.
	PCB A(A-1, A-2) ASS'Y						800001
	PCB A(A-1, A-2) BLANK						1610174
	PCB A-1 ASS'Y						800002
	PCB A-2 ASS'Y						800004
	PCB A-1, BLANK						700003
	PCB A-2, BLANK						700004
PCB A-1 ASS'Y (INCLUDING FOLLOWING)							
CAPACITORS							
THE FOLLOWING CODE INDICATED VARIATION OF CAPACITORS AGAINST TEMPERATURE F = +80% −20%(−25 TO 85°C), B = + −10% −10%(−25 TO 85°C), CH = 0 ± 60ppm/°C(−25 TO 85°C) CK = 0 ± 250ppm/°C(−25 TO 85°C), SL = +350ppm/°C TO −1000pp°C							
C1	CERAMIC	0.01uF	50V +80% −20%	F			4110315
C2	BLANK						
C3	CERAMIC	470pF	50V + −10%	B			4147114
C4	CERAMIC	680pF	50V + −10%	B			4168114
C5	CERAMIC	0.01uF	50V +80% −20%	F			4110135
C6	CERAMIC	0.022uF	50V +80% −20%	F			4122315
C7	CERAMIC	0.001uF	50V +80% −20%	F			4110215
C8	CERAMIC	220pF	50V + −10%	B			4122114
C9-10	CERAMIC	0.01uF	50V +80% −20%	F			4110315
C11	CERAMIC	0.001uF	50V +80% −20%	F			4110215
C12	CERAMIC	0.022uF	50V +80% −20%	F			4122315
C13	CERAMIC	5pF	50V + −0.25pF	CH			4105002
C14	CERAMIC	220pF	50V + −10%	B			4122114
C15	BLANK						
C16	CERAMIC	2pF	50V + −0.25pF	CK			4102000
C17	CERAMIC	0.01uF	50V +80% −20%	F			4110315
C18	CERAMIC	0.001uF	50V +80% −20%	F			4110215
C19	SEMICONDUCTOR (UZE)	0.1uF	25V + −20%				4110416
C20	ELECT.	22uF	16V + −20%				4422610
C21	CERAMIC	0.01uF	50V +80% −20%	F			4110315
C22	ELECT.	47uF	10V + −20%				4447610
C23	ELECT.	10uF	16V + −20%				4410610
C24	CERAMIC	0.001uF	50V +80% −20%	F			4110215
C25	SEMICONDUCTOR (UZE)	0.047uF	25V + −20%				4147316
C26	CERAMIC	0.01uF	50V +80% −20%	F			4110315
C27-28	CERAMIC	47uF	10V + −20%				4447610
C29	ELECT.	10uF	16V + −20%				4410600
C30-32	CERAMIC	220pF	50V + −20%	B			4122114
C33	CERAMIC	3pF	50V + −0.25pF	CK			4103000
C34	SEMICONDUCTOR (UZE)	0.047uF	25V + −20%				4147316
C35-36	CERAMIC	0.01uF	50V +80% −20%	F			4110315
C37	CERAMIC	0.0047uF	50V +80% −20%	F			4147215
C38	CERAMIC	0.01uF	50V +80% −20%	F			4110315
C39	SEMICONDUCTOR (UZE)	0.022uF	16V + −10%				4122227
C40	CERAMIC	0.01uF	50V +80% −20%	F			4110315
C41	ELECT.	2.2uF	50V + −20%				4422500
C42	ELECT.	47uF	10V + −20%				4447610
C43	CERAMIC	33pF	50V + −5%	SL			4133013
C44	ELECT.	0.1uF	50V + −20%				4410400
C45	ELECT.	47uF	10V + −20%				4447610
C46	ELECT.	0.1uF	50V + −20%				4410400
C47	ELECT.	10uF	16V + −20%				4410610

REF. NO.	DESCRIPTIONS				RS LOCATION NO.	MFR. PART NO.
C48	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C49	CERAMIC	47pF	50V+-5%	CH		4147002
C50	POLYSTYRENE	0.001uF	50V+-5%			4510200
C51	SEMICONDUCTOR (UZE)	0.0022uF	35V+-10%			4122228
C52-53	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C54	MYLAR	0.0056uF	50V+-5%			4656200
C55-56	SEMICONDUCTOR (UZE)	0.01uF	16V+-10%			4110327
C57	CERAMIC	220pF	50V+-20%	B		4122114
C58	SEMICONDUCTOR (UZE)	0.047uF	25V+-20%			4147316
C59-60	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C61	CERAMIC	220pF	50V+-10%	B		4122114
C62-66	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C67	CERAMIC	0.001uF	50V+80%-20%	F		4110215
C68	CERAMIC	5pF	50V+-0.25pF	SL		4105013
C69	CERAMIC	1pF	50V+-0.25pF	SL		4101013
C70	BLANK					
C71	CERAMIC	27pF	50V+-5%	SL		4127013
C72	SEMICONDUCTOR (UZE)	0.1uF	16V+-20%			4110426
C73	ELECT.	47uF	10V+-20%			4447610
C74-77	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C78	ELECT.	47uF	10V+-20%			4447610
C79	ELECT.	10uF	16V+-20%			4410610
C80	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C81	CERAMIC	56pF	50V+-5%	CH		4156002
C82	CERAMIC	47pF	50V+-5%	CH		4147002
C83	CERAMIC	56pF	50V+-5%	CH		4156002
C84	CERAMIC	0.001uF	50V+80%-20%	F		4110215
C85-86	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C87	ELECT.	47uF	10V+-20%			4447610
C88-92	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C93	ELECT.	4.7uF	50V+-20%			4447510
C94-95	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C96	BLANK					
C97	CERAMIC	2pF	50V+-0.25pF	CK		4102000
C98	ELECT.	4.7uF	50V+-20%			4447510
C99	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C100	POLYSTYRENE	220pF	50V+-5%			4522100
C101	CERAMIC	10pF	50V+-0.5pF	CH		4110002
C102	CERAMIC	2pF	50V+-0.25pF	CK		4102000
C103	BLANK					
C104	SEMICONDUCTOR (UZE)	0.027uF	16V+-10%			4127327
C105	CERAMIC	5pF	50V+-0.25pF	CH		4105002
C106	ELECT.	10uF	16V+-20%			4410610
C107	CERAMIC	470pF	50V+-10%	B		4147114
C108	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C109	ELECT.	220uF	10V+-20%			4422710
C110	CERAMIC	0.01uF	50V+80%-20%	F		4110315
C111	SEMICONDUCTOR (UZE)	0.047uF	25V+-20%			4147316
C112	ELECT.	10uF	16V+-20%			4410600
COILS						
L101	INDUCTOR COIL	4.7uH				1130020
L102	INDUCTOR COIL	18uH				1130040
L103	INDUCTOR COIL	47uH				1130180
L104	ADJUSTMENT COIL	1030				1121030
L105	INDUCTOR COIL	1uH				1130230
L106	INDUCTOR COIL	47uH				1130180
L107	INDUCTOR COIL	10mH				1130120

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
L108	INDUCTOR COIL 0.39uH		1130130
L109	INDUCTOR COIL 470uH		1130070
L110-1	INDUCTOR COIL 2.2uH		1130111
L112	BLANK		
L113	INDUCTOR COIL 0.39uH		1130130
L114	INDUCTOR COIL 8.2uH		1130170
L115	INDUCTOR COIL 2.2uH		1130111
L116	INDUCTOR COIL 8.2uH		1130170
L117	ADJUSTMENT COIL 1040		1121040
L118	INDUCTOR COIL 2.2uH		1130111
L119	BAR ANT. COIL 0130		1110131
L120	INDUCTOR COIL 1uH(B)		1130230
T101	ADJUSTMENT COIL 1020		1121020
T102	ADJUSTMENT COIL 0110		1120110
T103	ADJUSTMENT COIL 1010		1121010
T104	ADJUSTMENT COIL 1000		1121000
T105	ADJUSTMENT COIL 0990		1120990
T106	ADJUSTMENT COIL 0950		1120950
T107	TOROID COIL 720uH		1150000
T108-10	ADJUSTMENT COIL 0970		1120970
T111	ADJUSTMENT COIL 0960		1120960
T112	ADJUSTMENT COIL 1340		1121340
CONNECTORS			
J'	CONNECTOR HOUSING 4 PIN		1700020
L'	CONNECTOR HOUSING 8 PIN		1700080
CRYSTALS			
X101	CRYSTAL 55.405MHz		1650020
XF101-2	CRYSTAL 55.845MHz		1650040
CR101	RESONATOR 451KHz		1650061
DIODES			
D101	BLANK		
D102	DIODE 1S2222		1040100
D103-4	DIODE FC52M-5/-6		1040151/2
D105-6	DIODE 1N60P		1040121
D107	DIODE 1N60		1040120
D108-9	DIODE 1N60P		1040121
D110	DIODE KB262		1040050
D111-2	DIODE 1N60P		1040121
D113-7	DIODE 1N4148TR		1040021
D118	DIODE 1S2222		1040100
D119	DIODE 1N4148TR		1040021
D120	DIODE KB262		1040050
D121	DIODE 1S2222		1040100
D122	DIODE SVC-201SP		1040090
D123-9	DIODE 1N4148TR		1040021
D130	DIODE FC52M-5/-6		1040151/2
D131	DIODE 1N4148TR		1040021
FILTERS			
CF101-2	CERAMIC FILTER SFE10.7MA8-A		1660080
CF103	CERAMIC FILTER SFA10.7MF5K/6		1660090/270
CF104	CERAMIC FILTER SFP450I		1660170
CF105	CERAMIC FILTER FSR450K		1660120
INTERGRATED CIRCUITS			
IC101	IC UPD1018C, AM/FM IF AMP NEC		1010340

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
IC102	IC LA5003, REGULATOR SANYO		1010140
JACK			
JK101	EXT ANT JACK		1649010
RESISTORS (ALL CARBON FILM 1/6W ±5% UNLESS NOTED OTHERWISE)			
R1	1K ohm		6050736
R2	33 ohm		6050718
R3-4	47K ohm		6050756
R5	820 ohm 1/8W		6010135
R6	1.2K ohm		6050737
R7	4.7K ohm		6050744
R8	3.9 ohm		6050707
R9-10	5.6K ohm		6050745
R11	10K ohm		6050748
R12	8.2K ohm		6050747
R13	1M ohm 1/8W		6010572
R14	100K ohm		6050760
R15	470 ohm		6050732
R16	1K ohm 1/8W		6010136
R17	330K ohm 1/8W		6010166
R18	2.2K ohm		6050740
R19	560 ohm 1/8W		6010533
R20	560 ohm 1/8W		6010533
R21	330 ohm		6050730
R22-23	22K ohm		6050752
R24-25	1K ohm 1/8W		6010136
R26-27	6.8K ohm		6050746
R28	12K ohm		6050749
R29	470 ohm		6050732
R30	1.2K ohm		6050737
R31	470 ohm		6050732
R32	33K ohm		6050754
R33	680 ohm		6050734
R34	27K ohm		6050753
R35	270 ohm		6050729
R36	470 ohm		6050732
R37	120 ohm		6050725
R38	3.9 ohm		6050707
R39	39K ohm		6050755
R40	22K ohm		6050752
R41	10K ohm		6050748
R42	1M ohm		6050772
R43	100K ohm		6050760
R44	3.9K ohm		6050743
R45	470 ohm		6050732
R46	33 ohm		6050718
R47	2.7K ohm		6050741
R48	1.8K ohm		6050739
R49	3.9K ohm		6050743
R50	820 ohm		6050735
R51	2.7K ohm		6050741
R52	6.8K ohm		6050746
R53	22K ohm		6050752
R54	100 ohm		6050724
R55	4.7K ohm		6050744
R56	270K ohm		6050765
R57	1.8K ohm		6050739

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
R58	2.7K ohm		6050741
R59-60	6.8K ohm		6050746
R61	68K ohm		6050758
R62	680K ohm		6050770
R63	39K ohm		6050755
R64	15K ohm		6050750
R65	22K ohm		6050752
R66	39K ohm		6050755
R67	15K ohm		6050750
R68	22K ohm		6050752
R69	560K ohm		6050769
R70	BLANK		
R71	220 ohm		6050728
R72	33K ohm		6050754
R73	470K ohm		6050768
R74	22K ohm		6050752
R75	47K ohm 1/8W		6010556
R76-77	150K ohm		6050762
R78	220 ohm		6050728
R79	12K ohm		6050749
R80	8.2K ohm		6050747
R81	330 ohm		6050730
R82	100 ohm		6050724
R83	2.7K ohm		6050741
R84	15K ohm		6050750
R85	100K ohm		6050760
R86	180K ohm 1/8W		6010563
R87	47K ohm		6050756
R88-89	3.3K ohm		6050742
R90-91	100 ohm		6050724
R92	2.7K ohm		6050741
R93	22K ohm 1/8W		6010552
R94	1.5K ohm		6050738
R95	68K ohm		6050758
R96	100K ohm		6050760
R97	22K ohm		6050752
R98	100 ohm		6050724
R99	3.9K ohm		6050743
R100	100 ohm		6050724
R101	2.7K ohm 1/8W		6010541
R102	39K ohm		6050755
R103	47K ohm		6050756
R104-5	8.2K ohm		6050747
R106-7	5.6K ohm 1/8W		6010545
R108	27K ohm		6050753
R109	1K ohm		6050736
R110	8.2K ohm		6050747
R111	39K ohm		6050755
R112	3.3K ohm 1/8W		6010142
R113	470K ohm		6050768
R114	100 ohm		6050724
R115	3.9 ohm		6050743
R116	330 ohm		6050730
R117	10K ohm		6050748
R118	18K ohm		6050751
R119	22K ohm		6050752
R120	27K ohm		6050753

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
R121	10K ohm		6050748
R122	330 ohm		6050730
R123	100K ohm		6050760
R124	1K ohm		6050736
R125	470 ohm		6050732
R126	220 ohm		6050728
R127	470 ohm		6050732
R128	1K ohm		6050736
R129	82K ohm		6050759
R130	100 ohm		6050724
R131	3.3K ohm		6050742
R132	680 ohm 1/8W		6010534
R133	3.9 ohm		6050707
R134	330K ohm 1/8W		6010566
R135	330 ohm 1/8W		6010530
R136	270 ohm		6050729
SWITCH			
S101	SWITCH 1 POLE 2 POSITION (EXT. PIN)		1630240
TRANSISTORS			
Q101	FET 2SK212E		1030001
Q102	TRANSISTOR 2SC2999D		1020181
Q103	TRANSISTOR 2SC2839E		1022000
Q104-5	TRANSISTOR 2SC3330S		1022020
Q106-7	TRANSISTOR 2SA1317S		1020270
Q108	TRANSISTOR 2SC2839D/E		1022002/0
Q109	TRANSISTOR 2SC3330T/U		1022023/1
Q110	FET 2SK152-2/291Q		1030030/60
Q111-2	TRANSISTOR 2SA1317T/U		1020273/1
Q113	TRANSISTOR 2SA1317U		1020271
Q114	TRANSISTOR 2SA1317T/U		1020273/1
Q115	FET 2SK152-3/291R		1030031/61
Q116	TRANSISTOR 2SC3330S		1022020
Q117-8	FET 2SK152-2/-1		1030030/2
Q119	TRANSISTOR 2SC2839E		1022000
Q120	FET 2SK212E		1030001
Q121	TRANSISTOR 2SC2839E		1022000
Q122-6	TRANSISTOR 2SA1317T/U		1020273/1
Q127	TRANSISTOR 2SC2999E		1020180
Q128	TRANSISTOR 2SC2839E		1022000
Q129	TRANSISTOR 2SC2999E		1020180
Q130	FET 2SK381A		1030070
TRIMMERS			
VT101-2	TRIMMER 20P(B)		1210020
VT103	TRIMMER 100P		1210030
VARIABLE RESISTOR			
VR101	SEMI-FIXED 500B		1320050
PVC WIRES			
W101	PVC WIRE 100(9+9)mm RED		8171662
W102	PVC WIRE 80(9+9)mm WHITE		8171269
W103	PVC WIRE 110(9+9)mm SKY BLUE		8171869
W104	PVC WIRE 100(9+9)mm BLUE		8171666
W105	PVC WIRE 80(9+9)mm BROWN		8171261
W106	PVC WIRE 80(9+9)mm ORANGE		8171263
W107	PVC WIRE 80(9+9)mm YELLOW		8171264

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
W108	PVC WIRE 90(9+9)mm PINK		8171463
W109-10	PVC WIRE 80(9+9)mm GREEN		8591265
W111	PVC WIRE 150(6+9)mm WHITE		8152659
W01	PVC WIRE 240(6+6)mm RED		8154242
W02	PVC WIRE 120(6+6)mm BLACK		8152040
JUMP WIRES			
J101-13	JUMP WIRE 52mm 0.6ϕ		8000158
J114	BLANK		
J115	JUMP WIRE 7.5mm 0.6ϕ		8000030
J116	JUMP WIRE 12.5mm 0.6ϕ		8000050
J117	JUMP WIRE 52mm 0.6ϕ		8000158
END OF PCB A-1			
PCB A-2 ASS'Y (INCLUDING FOLLOWING)			
CAPACITORS			
C201	CERAMIC 0.01uF 50V+80%−20% F		4110315
C202	ELECT. 0.47uF 50V+−20%		4447400
C203	BLANK		
C204	CERAMIC 39pF 50V+−5% SL		4139013
C205-6	SEMICONDUCTOR (UZE) 0.047uF 25V+−20%		4147316
C207	ELECT. 0.47uF 50V+−20%		4447400
C208	SEMICONDUCTOR (UZE) 0.0033uF 16V+−10%		4133227
C209	SEMICONDUCTOR (UZE) 0.01uF 16V+−10%		4110327
C210	SEMICONDUCTOR (UZE) 0.047uF 25V+−20%		4147316
C211-2	TANTALUM 0.47uF 16V+−20%		4347400
C213	TANTALUM 1uF 16V+−20%		4310500
C214	SEMICONDUCTOR (UZE) 0.01uF 16V+−10%		4110327
C215	SEMICONDUCTOR (UZE) 0.0033uF 16V+−10%		4133227
C216	ELECT. 100uF 10V+−20%		4410710
C217	ELECT. 1uF 50V+−20%		4410510
C218	ELECT. 47uF 10V+−20%		4447610
C219-20	SEMICONDUCTOR (UZE) 0.0022uF 16V+−10%		4122227
C221-2	SEMICONDUCTOR (UZE) 0.027uF 16V+−10%		4127327
C223-4	ELECT. 0.47uF 50V+−20%		4447400
C225-6	ELECT. 4.7uF 25V+−20%		4447500
C227-8	SEMICONDUCTOR (UZE) 0.039uF 25V+−20%		4139316
C229-30	ELECT. 0.33uF 50V+−20%		4433400
C231-2	ELECT. 4.7uF 25V+−20%		4447500
C233-4	CERAMIC 470pF 50V+−10% B		4147114
C235	ELECT. 100uF 10V+−20%		4410710
C236	POLYSTRENE 0.001uF 50V+−5%		4510200
C237	CERAMIC 0.01uF 50V+80%−20% F		4110135
C238-9	ELECT. 0.47uF 50V+−20%		4447400
DIODES			
D201-2	DIODE 1N4148TR		1040021
D203	DIODE UZ-10BM		1041020
D204	DIODE KB162		1040140
D205-6	DIODE 1N4148TR		1040021
D207	BLANK		
D208-9	DIODE 1N4148TR		1040021
D210	LED 2mm×5mm GREEN		1053040
D211-6	LED 2mm×5mm RED		1050080
INTERGRATED CIRCUITS			
IC201	IC LA3361, FM MPX DEMODULATOR SANYO		1010110
IC202	IC TA7366P, SIGNAL STRENGTH/LED DRV. TOSHIBA		1010270
IC203	IC M6900L, DUAL PRE AMPLIFIER MITSUBISHI		1010470

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
RESISTORS (ALL CARBON FILM 1/6W ±5% UNLESS NOTED OTHERWISE)			
R201	27K ohm		6050753
R202	22K ohm		6050752
R203	1M ohm		6050772
R204	10K ohm		6050748
R205	1K ohm		6050736
R206	22K ohm		6050752
R207	10K ohm		6050748
R208	1K ohm		6050736
R209	1M ohm		6050772
R210	270K ohm		6050765
R211	2.2K ohm		6050740
R212	4.7M ohm		6050780
R213	10K ohm		6050748
R214	470K ohm		6050768
R215	100K ohm 1/8W		6010560
R216	1.2M ohm		6050773
R217	150K ohm		6050762
R218	100K ohm		6050760
R219	220K ohm		6050764
R220-1	100K ohm		6050760
R222	150K ohm		6050762
R223	1.5K ohm		6050738
R224	27K ohm		6050753
R225	1.2 ohm		6050737
R226	10K ohm		6050748
R227	470K ohm		6050768
R228	BLANK		
R229	18K ohm		6050751
R230	2.2K ohm		6050740
R231	3.9K ohm		6050743
R232	4.7K ohm		6050744
R233	1K ohm 1/8W		6010136
R234	5.6K ohm		6050745
R235	510 ohm 1/8W		6010598
R236	2.2K ohm		6050740
R237	3.9K ohm		6050743
R238	18K ohm		6050751
R239	100 ohm		6050724
R240	1K ohm		6050736
R241	2.2K ohm		6050740
R242	68K ohm		6050758
R243-7	1.2K ohm 1/8W		6010137
R248	100 ohm		6050724
R249-50	330 ohm		6050730
R251-2	10K ohm		6050748
R253-4	3.9K ohm		6050743
R255-6	6.8K ohm		6050746
R257-8	2.2K ohm		6050740
R259-60	680 ohm		6050734
R261-2	4.7K ohm		6050744
R263-4	100K ohm		6050760
R265-6	390K ohm		6050767
R267-8	47K ohm		6050756
R269	100 ohm		6050724
R270	1.2K ohm		6050737
R271	22K ohm		6050722

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR.PART NO.
SWITCHES			
S201	SWITCH 1 POLE 2 POSITION, LOCK		1630010
S202	SWITCH 2 POLE 2 POSITION, BFO		1630070
S203	SWITCH 1 POLE 2 POSITION, MODE		1630010
S204	SWITCH 1 POLE 1 POSITION, POLUER		1630230
TRANSISTORS			
Q201-3	TRANSISTOR 2SC3330T/U		1022023/1
Q204	TRANSISTOR 2SC3330U		1022021
Q205	TRANSISTOR 2SA1317ET/U		1020273/1
Q206	TRANSISTOR 2SA1317U		1020271
Q207-8	TRANSISTOR 2SC3330S		1022020
Q209	TRANSISTOR 2SA1317U		1020271
Q210	TRANSISTOR 2SC3330T/U		1022023/1
VARIABLE RESISTORS			
VR201	ROTARY VR 1KRD		1310060
VR202	SEMI-FIXED VR 1MB		1320070
VR203	ROTARY VR 100KB		1310050
VR204	SEMI-FIXED VR 10KB		1320000
VR205-6	SLIDE VR 50KD x 2		1300050
VR207	SLIDE VR 50KA x 2		1300020
VR208	SLIDE VR 100KW		1300040
PVC WIRE			
W202	PVC WIRE 240(3 + 3)mm WHT		8154215
JUMP WIRES			
J201-20	JUMP WIRE 52mm 0.6ϕ		8000158
END OF PCB A-2			
PCB A-3			
	PCB A-3 ASS'Y, SWITCH PCB		800002
	PCB A-3, BLANK		700002
SWITCHES			
S501-3	SWITCH 1 POLE 1 POSITION		1630230
END OF PCB A-3			
END OF PCB A			
	PCB-B ASS'Y, POWER PCB		810001
	PCB-B, POWER PCB, BLANK		1610182
PCB B ASS'Y (INCLUDING FOLLOWING)			
CAPACITORS			
C301	SEMICONDUCTOR (UZE) 0.1uF 25V + −20%		4110416
C302	ELECT. 4.7uF 50V + −20%		4447510
C303	ELECT. 10uF 16V + −20%		4410600
C304	CERAMIC 68pF 50V + −5% SL		4168013
C305	ELECT. 10uF 16V + −20%		4410600
C306	ELECT. 220uF 10V + −20%		4422714
C307	ELECT. 220uF 16V + −20%		4422713
C308	ELECT. 4.7uF 50V + −20%		4447510
C309	ELECT. 1000uF 16V + −20%		4410813
C310	SEMICONDUCTOR (UZE) 0.1uF 25V + −20%		4110416
C311-2	ELECT. 100uF 10V + −20%		4410710
C313	ELECT. 1000uF 10V + −20%		4410812
C314	ELECT. 47uF 10V + −20%		4447610
C315	CERAMIC 50pF 50V + −5% SL		4150013
C316	ELECT. 100uF 10V + −20%		4410710

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
C317-8	MYLAR 0.15uF 50V + − 5%		4615400
C319	CERAMIC 50pF 50V + − 5% SL		4150013
C320-1	ELECT. 470uF 10V + − 20%		4447711
C322-3	ELECT. 1uF 50V + − 20%		4410510
COILS			
L301-2	INDUCTOR COIL 1.5mH		1130090
L303	INDUCTOR COIL 2.2mH		1130100
T301	ADJUSTMENT COIL 0680		1120680
DIODES			
D301	DIODE UZ-13BM		1041030
D302-5	DIODE 1N4148		1040020
INTERGRATED CIRCUIT			
IC301	IC UPC1263C2/1316C, POWER AMP NEC		1010350/360
JACKS			
JK301	DC JACK		1647000
JK302	HEADPHONE JACK (3.5ϕ)		1640040
RESISTORS (ALL CARBON FILM 1/8W ±5% UNLESS NOTED OTHERWISE)			
R301	100 ohm 1/4W		6020424
R302	100K ohm		6010160
R303	56K ohm		6010157
R304	27K ohm		6010553
R305	150K ohm		6010562
R306	1.2K ohm		6010537
R307	4.7K ohm		6010544
R308	10 ohm 1/4W		6020012
R309	330K ohm		6010566
R310	10K ohm		6020148
R311	2.2K ohm		6010540
R312-3	100 ohm		6010524
R314	100 ohm		6020124
R315	150K ohm		6010562
R316	12K ohm 1/4W		6020449
R317-8	270K ohm		6020465
R319	100 ohm		6010124
R320-1	47K ohm		6010556
R322-3	1K ohm		6010536
R324-5	6.8K ohm		6010546
TRANSISTORS			
Q301-2	TRANSISTOR 2SC3330U		1022021
Q303	TRANSISTOR 2SC3330T/U		1022023/1
Q304	TRANSISTOR 2SC3330U		1022021
Q305	TRANSISTOR 2SB808F/G		1020040/1
Q306	TRANSISTOR 2SD1012G		1023000
Q307	TRANSISTOR 2SB808F/G		1020040/1
Q308-10	TRANSISTOR 2SC3330T/U		1022023/1
PVC WIRES			
W301	PVC WIRE 110(6+9)mm WHITE		8171659
W302	PVC WIRE 110(6+9)mm RED		8171852
W303	PVC WIRE 140(6+6)mm WHITE		8152449
W304	PVC WIRE 120(6+6)mm BLACK		8152040
W305	PVC WIRE 100 (6+9)mm GREEN		8171655
W306	PVC WIRE 150 (3+9)mm BLUE		8152636

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
JUMP WIRES			
J301-2	JUMP WIRE 5mm 0.6ϕ		8000010
J303-4	JUMP WIRE 7.5mm 0.6ϕ		8000030
J305-7	JUMP WIRE 10mm 0.6ϕ		8000040
J308	JUMP WIRE 12.5mm 0.6ϕ		8000050
J309-11	JUMP WIRE 20mm 0.6ϕ		8000061
J312	JUMP WIRE 7.5mm 0.6Φ		8000030
END OF PCB B			
	PCB C ASS'Y, DISPLAY PCB		820001
	PCB C, DISPLAY PCB, BLANK		1610192
PCB C ASS'Y (INCLUDING FOLLOWING)			
CAPACITORS			
C401	CERAMIC 0.01uF 50V+80%−20% F		4110315
C402	ELECT. 10uF 16V+ −20%		4410600
C403	CERAMIC 0.01uF 50V+80%−20% F		4110315
C404	BLANK		
C405	MYLAR 0.033uF 50V+ −5%		4633300
C406	METAL. POLY. 0.22uF 50V+ −10%		4822400
C407	BLANK		
C408	CERAMIC 0.001uF 50V+80%−20% F		4110215
C409	CERAMIC 0.01uF 50V+80%−20% F		4110315
C410	CERAMIC 39pF 50V+ −5% SL		4139013
C411	CERAMIC 15pF 50V+ −5% CH		4115002
C412	CERAMIC 39pF 50V+ −5% CH		4139002
C413	CERAMIC 0.001uF 50V+80%−20% F		4110215
C414	CERAMIC 22pF 50V+ −5% CH		4122002
C415	CERAMIC 15pF 50V+ −5% CH		4115002
C416	CERAMIC 0.001uF 50V+80%−20% F		4110215
C417	CERAMIC 33pF 50V+ −5% CH		4133002
C418	ELECT. 2.2uF 50V+ −20%		4422500
C419	ELECT. 220uF 6.3V+ −20%		4422712
C420	BLANK		
C421	ELECT. 100uF 4V+ −20%		4410700
C423	CERAMIC 0.001uF 50V+80%−20% F		4110215
CONNECTORS			
C'	CONNECTOR HOUSING 11 PIN		1700050
D'	CONNECTOR HOUSING 4 PIN		1702050
G'	CONNECTOR HOUSING 6 PIN		1700040
H'	CONNECTOR HOUSING 4 PIN		1702050
CRYSTALS			
X401	CRYSTAL 4500KHz		1650030
X402	CRYSTAL 32.768KHz		1650050
DIODES			
D401	DIODE KB162		1040140
D402-3	DIODE 1N4148		1040020
D407-8	DIODE 1N4148		1040020
INTERGRATED CIRCUITS			
IC401	IC CX7961A-1 SONY		1010401
IC402	LSI UPD7503G-A65 NEC		1000012
LAMP			
LP401	LAMP 3ϕ × 6.35 50mA 8V		1680010
LCD			
	LCD-803		1600020

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
RESISTORS (ALL CARBON FILM 1/8W + −5% UNLESS NOTED OTHERWISE)			
R401-2	560 ohm		6010533
R403	10 ohm		6010512
R404	2.2K ohm		6010540
R405	1.8K ohm		6010539
R406	1K ohm		6010536
R407	56K ohm		6010557
R408	4.7K ohm		6010544
R409	150 ohm		6010526
R410-11	10K ohm		6010548
R412	220K ohm		6010564
R413	33K ohm		6010554
R414-15	150K ohm		6010562
R416	6.8K ohm		6010546
R417	18K ohm		6010551
R418-20	100K ohm		6010560
R421	3.9K ohm		6010543
R422	330K ohm		6010566
R423	1M ohm		6010572
R424-6	47K ohm		6010556
R427	12K ohm		6010549
R428	100K ohm		6010560
R429	1M ohm		6010572
R430	4.7K ohm		6010544
R431	10 ohm		6010512
R432-3	10K ohm		6010548
R434	22K ohm		6010552
R435-6	10K ohm		6010548
R437	22K ohm		6010552
R438	27K ohm		6010553
R439-42	470K ohm		6010568
R443-5	5.6K ohm		6010545
R446	3.3K ohm		6010542
R447-8	220K ohm		6010564
R449	3.3K ohm		6010542
R450	330K ohm		6010566
R451	3.3K ohm		6010542
SWITCHES			
S401	SWITCH 1 POLE 2 POSITION, 9K/10K SW.		1630010
TRANSISTORS			
Q401	TRANSISTOR 2SC330S		1022020
Q402	FET 2SK381B		1030071
TRIMMERS			
VT401	TRIMMER 10P		1210003
VT402	TRIMMER 20P		1210020
PVC WIRES			
W351	PVC WIRE 240(6+9)mm BLACK		8154250
W352	PVC WIRE 240(6+9)mm RED		8154252
W401-2	PVC WIRE 70(9+9)mm RED		8591062
JUMP WIRES			
J401	JUMP WIRE 5mm 0.6ϕ		8000010
J402-3	JUMP WIRE 7.5mm 0.6ϕ		8000030
J404-6	JUMP WIRE 10mm 0.6ϕ		8000040
J407-8	JUMP WIRE 25mm 0.6ϕ		8000140

REF. NO.	DESCRIPTIONS	RS LOCATION NO.	MFR. PART NO.
END OF PCB C			
MULTUFORM WIRES			
A	3/WIRES 110(9+9)mm		8831860
B	11/WIRES 130(9+9)mm		8912260
C	11/WIRES 55(6+9)mm		8910750
D'	CTN WIRE ASS'Y 803-K		1703110
E	4/WIRES 120(9+9)mm		8842060
F	4/WIRES 90(9+9)mm		8841460
G'-1	1/SHIELD WIRE 200mm		8600020
G'-1&2	2/WIRES 50(3+6)mm		8820620
G'-3&4&5&6	4/WIRES 260(6+6)mm		8844440
I	1/SHIELD WIRE 250mm		8600010
J	4/WIRES 80(6+9)mm		8841250
K	3/WIRES 65(3+9)mm		8830930
L	8/WIRES 170(3+6)mm		8883020
SPEAKER			
	SPEAKER, 4" 8ohm 2W		1620080
OTHERS			
	CABLE TIE/100mm		8510000

TABLE OF ICS' & TRANSISTORS' VOLTAGE LIST

IC101

PIN NO	FM	AM	SSB/CW
1	0.09	1.75	1.75
2	0.71	0.04	0.04
3	0	0	0
4	1.45	0.07	0.07
5	1.85	0	0
6	2.96	0.02	0.02
7	2.48	0.02	0.02
8	1.85	0	0
9	0	0	0
10	0.01	0.75	0.75
11	0.06	2.96	2.96
12	0.06	2.96	2.96
13	0.31	0.31	0.31
14	0.01	0.71	0.71
15	0.09	2.18	2.18
16	0	0	0

IC102

PIN NO	FM	AM	SSB/CW
1	6.74	6.89	6.9
2	0	0	0
3	3.07	3.07	3.07
4	6.09	6.24	6.24

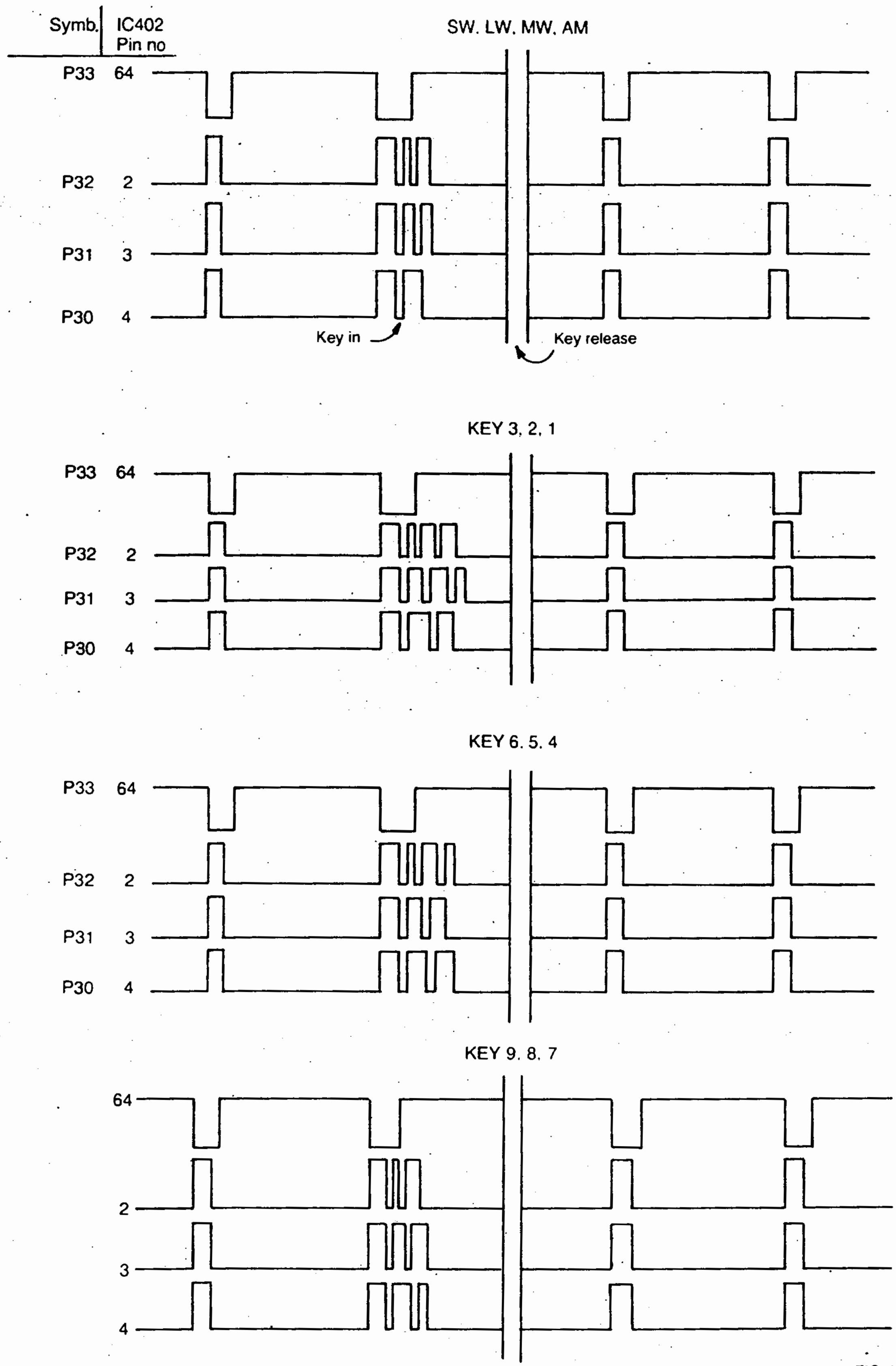
IC201

PIN NO	FM	AM	SSB/CW
1	5.96	0.01	0.01
2	2.36	0.01	0.02
3	1.7	0.01	0.01
4	1.76	0.01	0.01
5	1.76	0.01	0.05
6	5.37	5.54	5.52
7	0	0	0
8	0.49	0.01	0.01
9	0.06	0.03	0.04
10	1.36	0	0.04
11	1.36	0	0
12	1.02	0.01	0.01
13	1.36	0	0
14	1.36	0	0
15	1.36	0	0.01
16	0.82	0	0.01

UNIT OF VOLTAGE: V

IC402

PIN NO	FM	AM	SSB/CW
1	NC	NC	NC
2 3 4	OUTPUT PORTS (APPENDIX FIGURE 4)		
5	2.9	2.9	2.9
6	0	0	0
7	2.9	2.9	2.9
8	2.9	2.9	2.9
9	2.9	2.9	2.9
10	2.9	2.9	2.9
11	2.9	2.9	2.9
12	0	2.9	2.9
13	0.1	0.1	0.1
14	2.9	0	0
15	2.9	2.9	2.9
16	0	150K-1620kHz: 2.9 1621K-29999kHz: 0	
17	0.1	0.1	0.1
18	2.9	2.9	2.9
19	2.9	2.9	2.9
20	1.5	1.5	1.5
21	1.5	1.5	1.5
22	0	0	0
23	0.15	0.15	0.15
24	1.1	1.1	1.1
25	2.0	2.0	2.0
26	2.9	2.9	2.9
27	NC	NC	NC
28	COM2		
29	COM1		
30	COM0		
31 ⁝ 54	LCD SEGMENT		
55	0	0	0
56	0	0	0
57	1.5	1.5	1.5
58	2.9	2.9	2.9
59	1.5	1.5	1.5
60	2.8	2.8	2.8
61	2.8	2.8	2.8
62	2.8	2.8	2.8
63	2.8	2.8	2.8
64	OUTPUT PORTS (APPENDIX FIGURE 4)		



Symb.
IC402 Pin no
SW. LW. MW. AM
P33 64
P32 2
P31 3
P30 4
Key in
Key release
KEY 3, 2, 1
P33 64
P32 2
P31 3
P30 4
KEY 6. 5. 4
P33 64
P32 2
P31 3
P30 4
KEY 9. 8. 7
64
2
3
4

FIG. 4

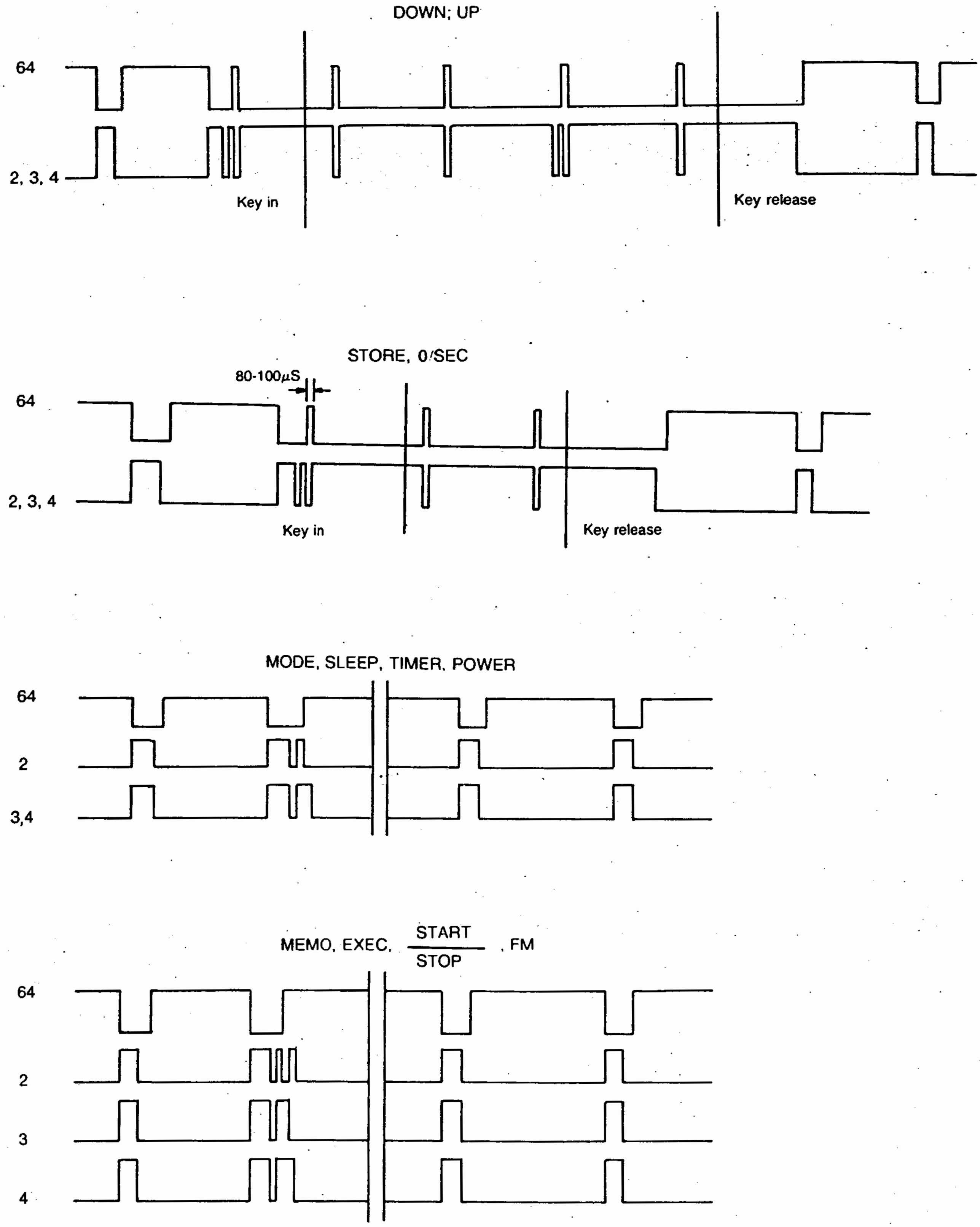

DOWN; UP
64
2, 3, 4
Key in
Key release
STORE, 0/SEC
80-100μS
64
2, 3, 4
Key in
Key release
MODE, SLEEP, TIMER, POWER
64
2
3,4
MEMO, EXEC, START/STOP, FM
64
2
3
4

FIG. 4

IC202

PIN NO	FM	AM	SSB/CW
1	5.33	5.33	5.332
2	5.26	5.26	5.26
3	5.25	5.25	5.25
4	5.24	5.24	5.24
5	0	0	0
6	5.24	5.24	5.24
7	1.43	1.43	1.43
8	1.44	1.44	1.44
9	6.67	6.67	6.67

IC203

PIN NO	FM	AM	SSB/CW
1	1.24	1.24	1.24
2	0.71	0.71	0.71
3	2.63	2.64	2.64
4	6.53	6.53	6.53
5	0	0	0
6	2 56	2.57	2.57
7	0.71	0.71	0.71
8	1.24	1.24	1.24

UNIT OF VOLTAGE: V

IC401

PIN NO	FM	AM	SSB/CW
1	-1.53	-1.55	-1.53
2	0.01	0.01	0.01
3	0.01	0.01	0.01
4	3.04	3.04	3.04
5	1.27	1.27	1.27
6	1.31	1.32	1.31
7	1.09	1.09	1.09
8	0.01	0	0
9	0.01	2.31	2.31
10	0	0	0
11	1.61	1.62	1.62
12	2.95	2.96	2.95
13	0	0	0
14	0	0	0

Transistors

		FM	AM	SSB/CW
Q101	G	0.01	0.01	0.01
	D	5.0	0.01	0.01
	S	0	0	0
Q102	B	0.7	0.7	0.7
	C	2.08	2.08	2.08
	E	0	0	0
Q103	B	0.92	0.64	0.64
	C	1.60	0.02	0.02
	E	0.23	0	0
Q104	B	0.66	0.66	0.66
	C	0.01	0.01	0.01
	E	0	0	0
Q105	B	0.49	0.50	0.49
	C	0.66	0.66	0.66
	E	0	0	0
Q106	B	2.00	2.00	2.01
	C	0.57	0.58	0.57
	E	2.58	2.58	2.58
Q107	B	1.96	1.96	1.97
	C	2.07	2.05	2.05
	E	2.58	2.58	2.58
Q108	B	0.05	0.51	0.5
	C	0.06	1.31	1.31
	E	0	0	0
Q109	B	0.05	0.72	0.72
	C	0.06	1.86	1.86
	E	0	0.012	0.012
Q110	G	0.04	1.04	0.11
	D	0.04	4.84	0.11
	S	0.04	0.87	0.11
Q111	B	0.01	5.18	0.34
	C	0	5.75	0.01
	E	0.01	5.84	0.38
Q112	B	0.07	5.35	5.26
	C	0.1	0.12	5.87
	E	0.01	5.92	5.93
Q113	B	0.07	5.26	5.82
	C	0.06	5.84	0.38
	E	0.01	5.92	5.93

		FM	AM	SSB/CW
Q114	B	0.01	5.75	5.32
	C	0	0	5.88
	E	0.01	5.92	5.94
Q115	G	0.04	0.11	0.11
	D	0.10	0.11	5.51
	S	0.09	0.11	1.06
Q116	B	0.62	0.68	0.68
	C	0.04	0.11	0.11
	E	0	0	0
Q117	G	0.03	0.08	0.07
	D	4.94	5.15	5.16
	S	1.18	1.15	1.15
Q118	G	0.03	0.08	0.07
	D	4.94	5.15	5.16
	S	1.18	1.15	1.15
Q119	B	0.06	0.68	0.68
	C	0.06	1.36	1.36
	E	0	0.01	0.01
Q120	G	0.01	0.01	0.01
	D	0.01	6.20	6.21
	S	0.01	1.04	1.04
Q121	B	0.64	0.91	0.91
	C	0.06	2.57	2.57
	E	0.05	0.32	0.32
Q122	B	3.69	2.37	2.37
	C	0.06	2.96	2.96
	E	3.07	3.07	3.07
Q123	B	6.29	6.32	6.34
	C	0.01	6.95	6.97
	E	6.86	7.01	7.03
Q124	B	0.01	6.32	6.33
	C	0	6.94	6.95
	E	0.01	6.95	6.97
Q125	B	2.37	3.30	3.32
	C	2.97	0.02	0.02
	E	3.07	3.07	3.07
Q126	B	6.15	6.45	6.46
	C	6.76	0.01	0.01
	E	6.86	7.01	7.03

NOTE: B—BASE, C—COLLECTOR, E—EMITTER; G—GATE, D—DRAIN, S—SOURCE
UNIT of VOLTAGE: V

Transistors

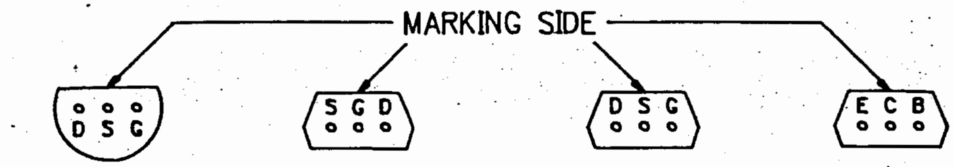
		FM	AM	SSB/CW
Q127	B	0.75	0.75	0.75
	C	2.14	2.14	2.14
	E	0	0	0
Q128	B	1.42	1.43	1.43
	C	1.73	1.78	1.78
	E	0.76	0.74	0.74
Q129	B	0.75	0.75	0.75
	C	2.59	2.58	2.58
	E	0	0	0
Q130	G	(5.17)	(1.74)	(1.95)
	D	13.49	2.53	13.56
	S	(5.4)	(1.96)	(2.19)
Q201	B	0.03	0.62	0.63
	C	0.03	0.09	0.09
	E	0	0	0
Q202	B	0	0.01	0.01
	C	0.01	6.43	6.44
	E	0	0	0
Q203	B	0	0.69	0.69
	C	8.71	0.15	0.15
	E	0	0	0
Q204	B	0.55	0.59	0.01
	C	0.01	0.06	5.84
	E	0	0	0
Q205	B	2.43	2.43	2.44
	C	3.04	3.05	3.06
	E	3.04	3.05	3.06
Q206	B	5.23	5.27	5.28
	C	3.04	3.05	3.06
	E	0	0	0
Q207	B	2.46	2.46	2.48
	C	3.04	3.05	3.06
	E	2.96	2.96	2.97
Q208	B	3.63	3.63	3.64
	C	7.24	7.3	7.31
	E	3.04	3.05	3.06
Q209	B	2.99	2.74	2.77
	C	0	0	0
	E	3.63	3.63	3.64

		FM	AM	SSB/CW
Q210	B	0.66	0.67	0.67
	C	0.01	0.02	0.02
	E	0	0	0
Q301	B	0.61	0	0.61
	C	(-2.07)	0	(-2.28)
	E	0	0	0
Q302	B	(-2.07)	0	(-2.28)
	C	7.89	0.88	7.86
	E	0	0	0
Q303	B	0.01	0.63	0.28
	C	14.09	0.03	14.09
	E	0	0	0
Q304	B	0.01	0.63	0.28
	C	8.59	1.57	8.59
	E	0	0	0
Q305	B	7.27	7.38	7.37
	C	7.93	8.04	8.04
	E	8.00	8.11	8.10
Q306	B	7.58	7.73	7.72
	C	7.93	8.04	8.04
	E	6.88	7.05	7.03
Q307	B	8.21	8.21	8.21
	C	8.92	8.93	8.92
	E	8.94	8.95	8.94
Q308	B	8.59	1.57	8.59
	C	8.92	8.93	8.92
	E	7.91	0.93	7.92
Q309	B	1.45	0.93	3.21
	C	0	0	0
	E	0	0	0
Q310	B	1.45	0.93	3.21
	C	0	0	0
	E	0	0	0
Q401	B	0.51	0.51	0.51
	C	(5.17)	(1.74)	(1.95)
	E	0	0	0
Q402	G	1.09	1.09	0.02
	D	2.7	2.7	2.99
	S	1.25	1.25	1.25

NOTE: B — BASE, C — COLLECTOR, E — EMITTER; G — GATE, D — DRAIN, S — SOURCE
UNIT of VOLTAGE: V

SEMICONDUCTOR LEAD IDENTIFICATIONS

Transistors



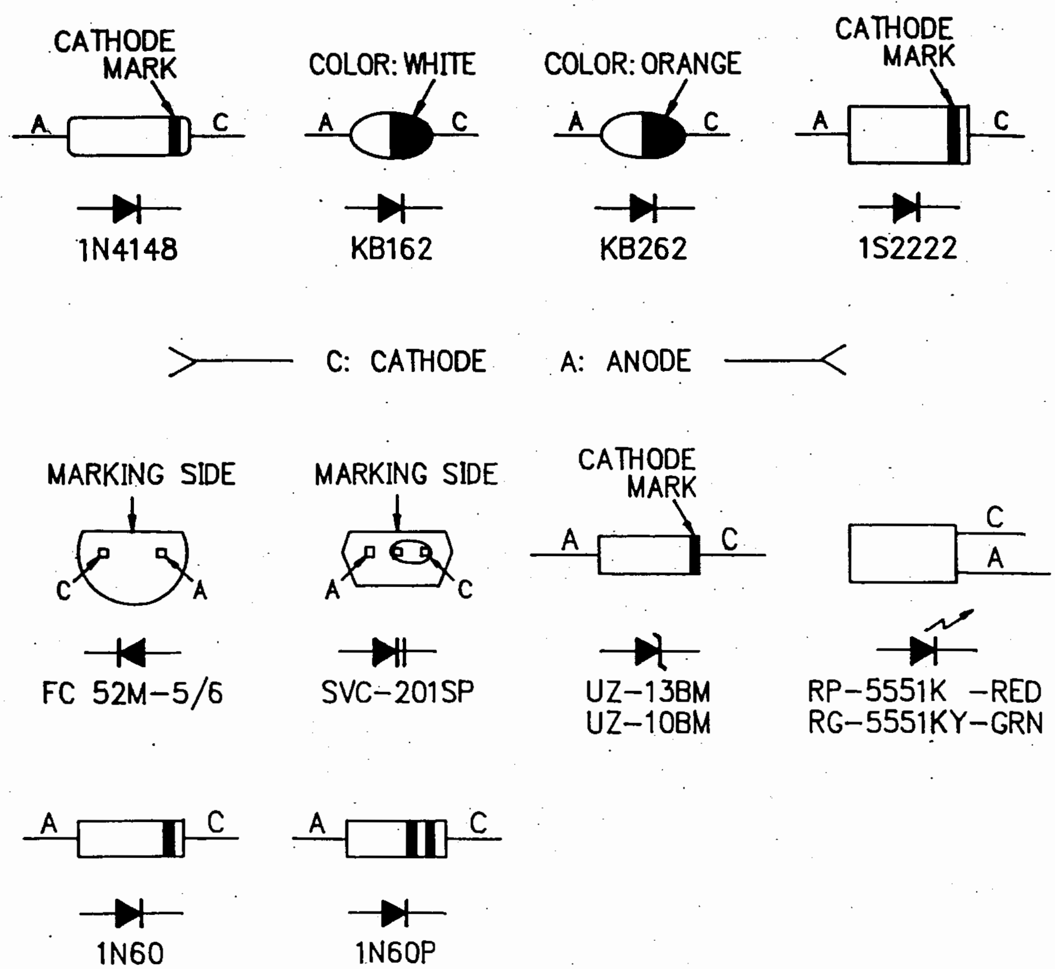
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Diodes



SCHEMATIC DIAGRAM

